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OPERATING PROCEDURE

"CHARM Access and operational Procedure"

ABSTRACT :

The aim of this procedure is to describe the good practices users should apply when using the CHARM facility.

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1. SCOPE OF THE DOCUMENT

This document presents the good practices users should follow before, during and after preparing a test for use in CHARM.

2. INTRODUCTION

2.1 ACCESS REQUESTS

Before entering CHARM, it is required to request access to the facility, the control room and the technical local. This is done via the CERN edh webpage (edh.cern.ch)

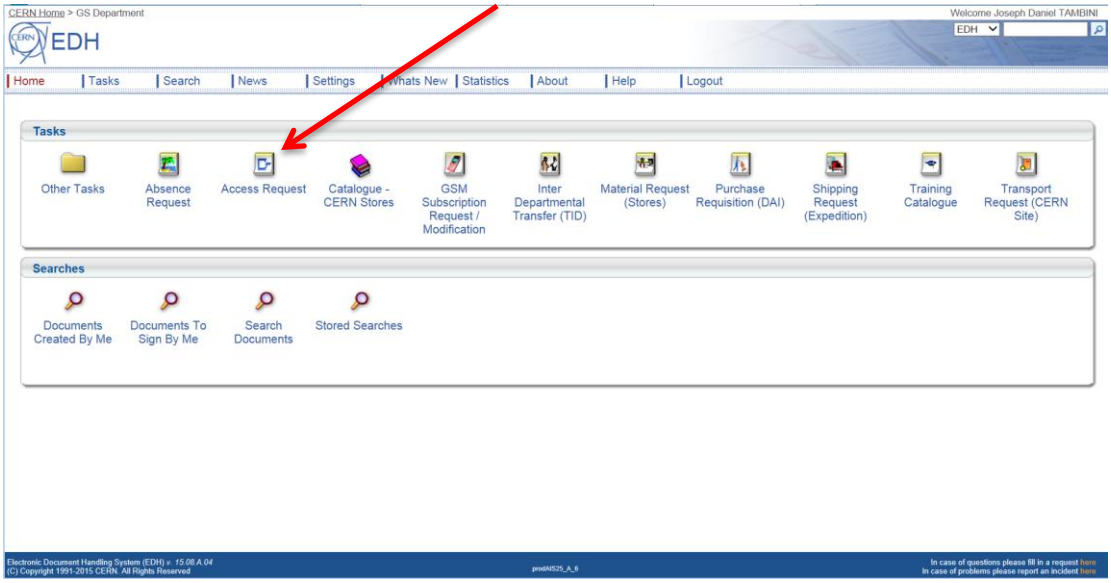
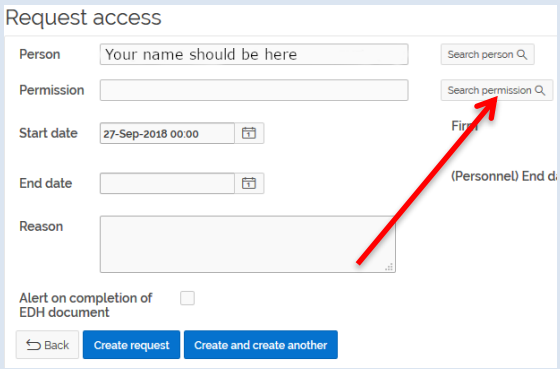
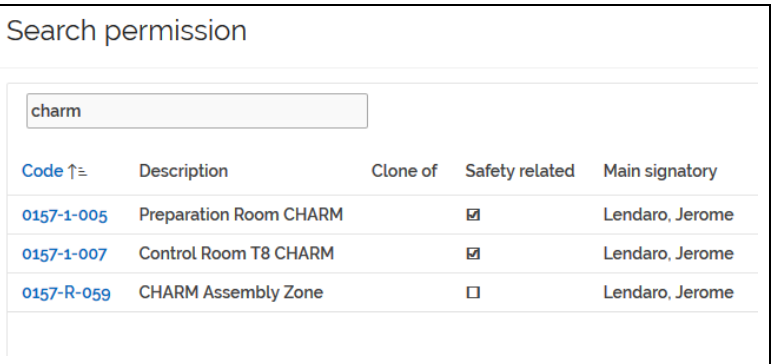
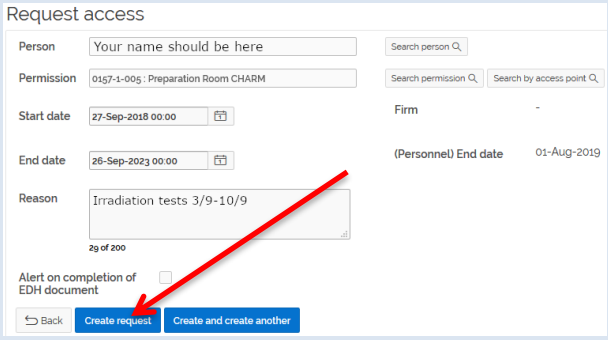


Figure 1 – EDH home page

Once at the edh page, click on Access Request as shown in Figure 1. From there you are redirected to ADaMS (CERN's Access Distribution and Management System), at the "Request access" tab. You can request for the necessary permissions by filling the form as follows:

	Steps	
☐	Search for the required permission:	

☐	Use the 'charm' keyword:	
☐	Start/End date: as required Reason: <u>For Users:</u> Radiation tests at CHARM <u>For Operators:</u> CHARM operation	
☐	Repeat the above procedure for all the required permissions.	

Be sure to have the following access permissions after the procedure:

Control Room T8 CHARM (0157-1-007)
Preparation Room CHARM (0157-1-005)
Irradiation facilities in East Area (IRRADS)
CHARM Assembly Zone (0157-R-059)*

only for users that install their equipment in a rack position (R)

A new training rank, called "CHARM or IRRAD" has been created.
In addition to this rank the other mandatory courses remain: CERN safety introduction, electrical safety awareness and CERN beam facilities.
Please make sure that you pass the new SIR course before May 1st, otherwise you will not be able to access from then on.
The SIR courses are available via http://hse.web.cern.ch/content/safety-training and then click on 'Online Courses'.

List of required safety courses:
10010 Safety at CERN
10200 Electrical Safety - Awareness
10800 CERN - Beam Facilities
50010 CHARM

2.2 CARD ACTIVATION

In order to access the CHARM control and technical rooms within the east hall, an activated card is required. Card activation can be done at the location within the east hall as shown in Figure 2.

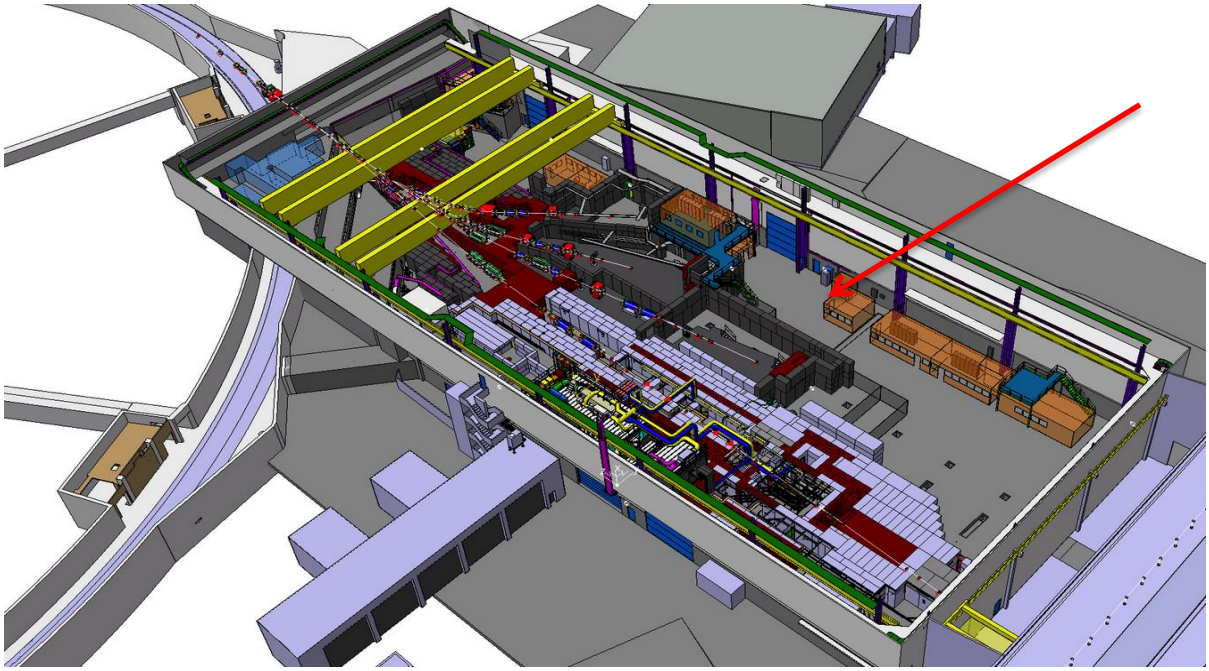


Figure 2 – Map of the East Hall, arrow pointing to location of card reader

To activate your card, simply hold it against the scanner shown until the light in Figure 3 goes green. Please note that this will activate your card for a month, after this it will need to be activated again. Below is a CERN power point on electronic locks [1], explaining how to activate the card.

Electronic locks instructions.pptx

Figure 3 – Card reader in the East hall

3. SAFETY

3.1 PERSONAL DOSIMETER

Two dosimeters need to be worn when entering CHARM: the personnal dosimeter and a DMC (operational) dosimeter, which is displaying the received dose during the access and which is beeping as a function of the residual dose rate.

To acquire the standard CERN dosimeter, go to Building 55, situated next to Entrance B as shown in Figure 4. Once in building B, the room to acquire a personal dosimeter is the first door to the right. (Note, the time slot for picking up a dosimeter is between 08:30-12:00) Fill out the necessary forms (Figure 5) and you will be awarded your personal dosimeter, which needs to be read at least once a month (in the reader shown in Figure 6, which can be found at various locations across CERN, including by the door for the south entrance to building 157).

Also when at building 55, a biometry needs to be taken to allow access to the CHARM facility. To do this, you go to reception to have the first eye scan taken. This is then put into a database and it's what is used to match against when you enter CHARM. Without the biometry, you cannot enter CHARM.

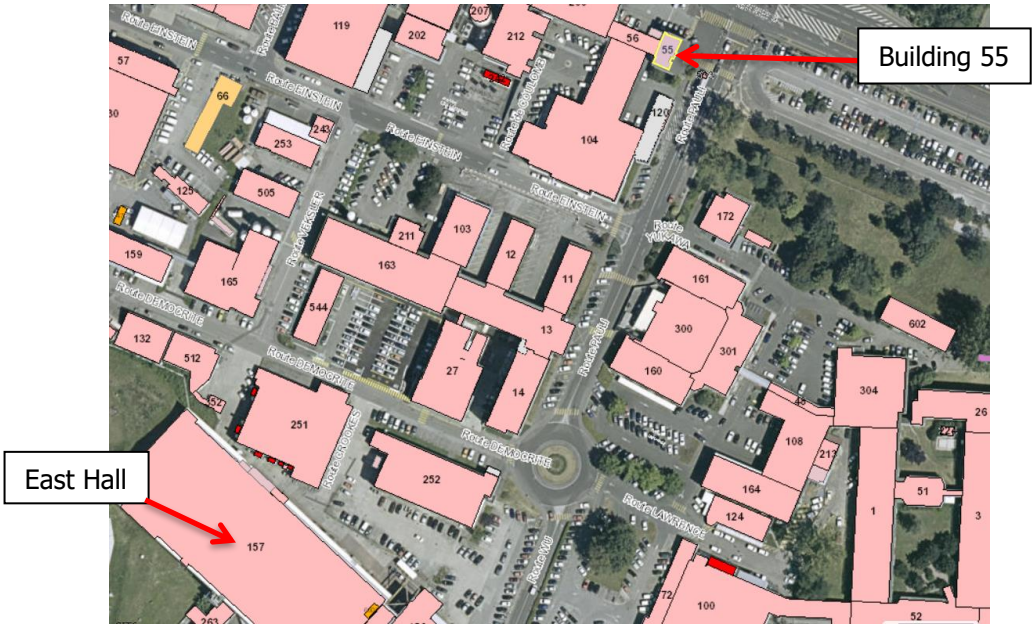
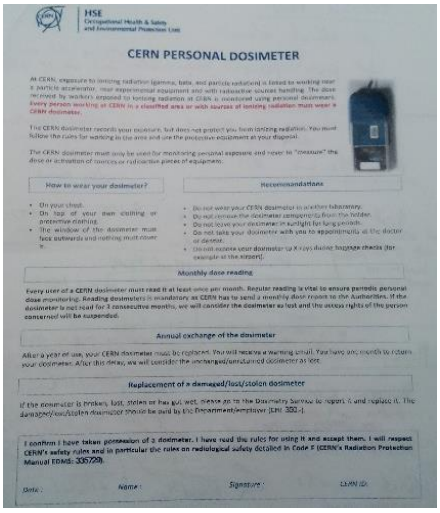


Figure 4 – Map of CERN showing the location of Building 55


HSE
Occupational Health & Safety and Environmental Protection Unit

CERN PERSONAL DOSIMETER

How to wear your dosimeter?

Recommendations

Monthly dose reading

Annual exchange of the dosimeter

Replacement of a damaged/lost/stolen dosimeter

Figure 5 – CERN personal dosimeter form

Figure 6 – CERN personal dosimeter reader

Without the medical visit, you can keep the personal dosimeter only for 2 months. If you require to get a personal dosimeter longer than 2 months, therefore you need to follow the steps which describe how to get a dosimeter:
http://dosimetry.web.cern.ch/en/dosimeter-obtain

3.2 DMC (OPERATIONAL DOSIMETER)

To obtain a personal DMC dosimeter, you need to follow the same steps as for the personal dosimeter.

If you need to punctually get a DMC dosimeter, it can be obtained from the cupboard in the control room. (NOTE: authorisation is needed before taking an operational dosimeter from the cupboard). To receive authorisation email Jerome Lendaro (Jerome.Lendaro@cern.ch)

3.3 PERSONAL PROTECTIVE EQUIPMENT

The necessary PPE (personal protective equipment) to be worn in the facility is:

- Helmet
- Safety shoes
- Personal and operational dosimeter

According to the kind of intervention, DGS/RP can ask you to wear some supplementary protective equipment (as for example gloves or ring dosimeter).

3.4 IMPACT

Also before accessing the facility, it is necessary to be added on IMPACT by the technical coordinator (Jerome Lendaro).

The IMPACT page can be found online via the CHARM webpage by clicking on "Additional Documentation" then on "Operation" and then on "CERN Impact Page".

The introduction and consumption of food and beverages within the CHARM facility is prohibited.

4. PRE-TEST

4.1 MAKE A TEST

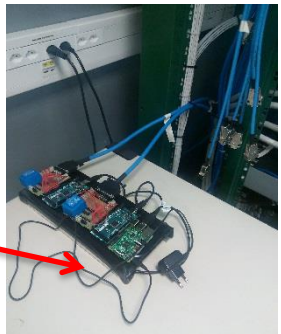
If you desire to make a test, the request can be done electronically by going to the CHARM website. From here, you click on the "Radiation Test Request" tab. Fill in the form displayed, save it and then email it to Salvatore Danzeca (Salvatore.Danzeca@cern.ch)

4.2 DRY RUN

In order for the users to be able to check the functionality of their setup before the radiation test (under identical conditions), there is a Dry-Run test location inside the CHARM facility. Indeed, in order to evaluate if the test setup will work inside the facility as it is expected, it is important to the equipment within the same "hardware" conditions. The purpose of a "dry run" is to replicate the conditions of the radiation test without the beam, hence without the radiation. This is done through 2 identical patch panels, as the ones that will be used during the radiation tests, meaning with the same connector and cable types. In addition, the cable length is also an important parameter to take into consideration while evaluating a test set-up. For this reason, the same cable length that will be used during the radiation test has been pulled between to 2 patch panels at the Dry Run test location (installed on the false floor)

The steps for the dry run are as follows:

Steps	
Cables and equipment are installed into duplicate patch panels located in the control room, which mirror the panels found in the technical local and inside the facility. When you enter the control room, on the right and the left, the patch panel are respectively corresponding to the patch panel located in the technical local (where the control system and power equipment will be connected) and to the patch panel located into the facility (where the test equipment will be connected). In this pictures the patch panel similar to the one used into the technical local is shown.	
Here, the panel on the opposite side, which is similar to the one used in the technical local.	
NOTE: The dry run is started at least 1 week before the real test starts. This give enough time to the user to react in case there is a problem on his equipment. After the equipment is set up for the dry run, it is run for the whole duration until it is moved to the facility for the radiation test.	
During the Dry Run test, there is the possibility to use a rack identical to the rack that will be used to host the equipment during the radiation test. Therefore the equipment to be tested is mounted to the rack to keep it in place during testing (using screws to keep it in place)	

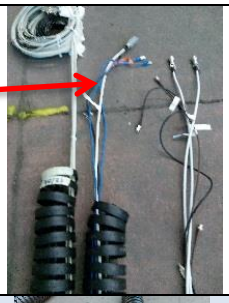
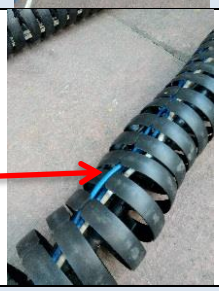
To assist with keeping heavier equipment in place, metal supports can be installed on the rack as shown. As well as the electronic equipment being set up, all the necessary cables are attached to allow for it to run as it would do during the real test.	
NOTE: It is also essential to ensure that the exact same equipment is used in the dry run as for the real test, so that the test is as realistic a mock as possible	
The control system and power equipment that will be used for the radiation test are connected to the patch-panel mirroring the one located in the technical local (Patch panel on the right when you enter the control room)	
It is also part of the dry run to check that test equipment not to be tested under radiation also works as expected (i.e. equipment that is connected to the panel in the technical local).	
This is what the setup of equipment that is connected to the patch panel would look like for the dry-run. (The equipment is mounted to the rack on the right side of the photo).	
NOTE: If during the Dry Run test, the equipment need to be connected to the GPN or to the TN, therefore care has to be taken when moving the equipment to the technical to declare in advance the outlet that will be used for the radiation test. Otherwise it might happen that when the Dry Run is finished and the user is ready to start the radiation test, it is not possible to connect the control system to the network in the control room and therefore the beginning of the test might be delayed.	
NOTE: After the Dry Run test: - If the test is successful, the user are allowed by the CHARM operation team to prepare their equipment for the radiation test. - If the test is not successful, the radiation test shall be aborted. ONLY the CHARM operation team decides if the radiation test can be performed.	

4.3 SETUP INSTALLATION

After a successful dry run and authorisation to proceed from the CHARM operation team, the users should prepare the setup installation. In case of testing in one of the rack positions (R*), the setup should be installed on the rack positioned at the assembly zone (157-R-059) by Tuesday morning. Access to the irradiation facility and rack placement is performed on Wednesday morning.

4.4 INSTALLING NEW CABLES IN CABLE CHAIN

Steps	
If the Dry Run test is successful, then the users can start preparing their equipment for the radiation test.	
⚠ The beam is still on at this point so it is not yet possible to access the facility	
Stop the dry run test	
Disconnect cables from the patch panels located in the Dry Run room (ready to put into cable chain)	
NOTE: if ends of cables are different, make sure you know which end of cable will be connected to the equipment under test and to the patch panels	
Open yellow door, allowing passage for cable chain. This door can only be opened by the technical coordinator of the facility (Jerome Lendaro)	
Lay cables out next to chain, ready to put in	

NOTE: Currently, cables are 2 metres longer than the cable chain on each side. When the cable chain is entered in the area, the first side to enter on the rail is the patch panel side.	
Cable guide has 3 sections within for different cables (make sure cables stay within chosen section)	
Put the cables in by moving the outer guard (ensure all cables are within guard, with NO bits protruding)	
NOTE : If lots of cables are being used, they can be grouped together in sections (try to group similar cables together, e.g power cables, control cables)	

5. BEFORE ACCESS

5.1 RP

The Technical coordinator (Jerome Lendaro) remotely removes target. This is performed in advance (see Fig.9) to allow for enough cooling down in order to reduce the residual dose rate. The beam is also usually shut off in advance (basically 3 hour is the time required by RP to allow the IRRAD team to enter their facility). The time before access to remove the target depends on configuration (see Fig.9), i.e. can be 12 hours before access. If lower beam intensity/more shielding then time to move out the target before access can be less. Although this rare, if the users or the CHARM operation team need to go closer to beam than the patch panel, the time could be longer (as the residual dose rate onto the target chamber is much higher than at the patch panel location) Figure 9 displays the cool-down periods (when the target has been moved out) as a function of beam intensity:

Average Beam Intensity I [protons/h]	Copper Target		Al/Al sieve target
	Mobile Shielding Retracted	Mobile Shielding Inside	
I < 9E13	3 hours	3 hours	3 hours
9E13 ≤ I < 1.3E14	12 hours	3 hours	3 hours
1.3E14 ≤ I	24 hours	12 hours	3 hours

Figure 9 – RP cool-down periods

Before access, ensure that the target table is put into parking position, the marble door should be closed and movable shielding layers 3 and 4 should be inside the target chamber. These measures help to reduce residual dose rate at the patch panel area. Jerome Lendaro as technical coordinator is the responsible of moving elements into the CHARM facility.

According to facility configuration required during the radiation test, movable shielding layers 3 and 4 should be put back in parking position at the end of the access.

Before access, the RP agent discuss with the CHARM technical coordinator to understand what it will be done during the access. Then the RP agent is doing the radiation survey according the access plan.

The technical coordinator is then informed about the residual dose rate at the different locations used during the access to define the expected access time at each of the critical position (e.g. if it is needed to enter inside the target chamber).

When this step has been completed, then people are allowed to start making the access which will be supervised by the technical coordinator.

5.2 DOSIMETER READINGS

As mentioned in section 3.2 (Operational Dosimeter), if you don't have a personal dosimeter one can be lent to you (contact Jerome Lendaro). In this case, this active dosimeter needs to be registered to you before entering CHARM. To do this, it needs to be placed in the slot of the reader shown in Figure 10, where inputting your CERN ID number and the relevant IMPACT number registers the dosimeter to you.

When leaving the CHARM facility after the access, the operational dosimeter should be placed in the slot again so that the dose taken during the access can be read and registered.

Operational dosimeters that are already registered to the user should also be read before and after being in the facility. The only difference before the access, is in this case there is no need to enter your CERNID, only the impact number is required.

The same is applicable to the CERN personal dosimeters, which are inserted into the reader shown in Figure 6 (preferably before and after the access).

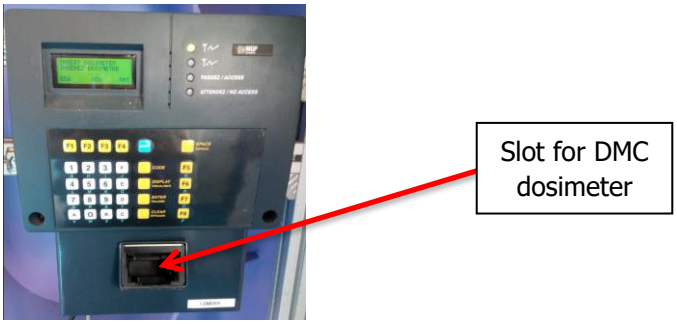
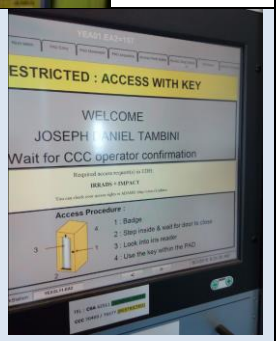
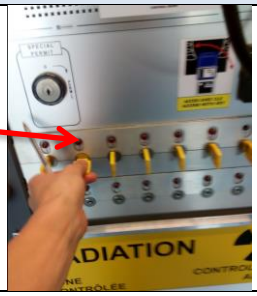
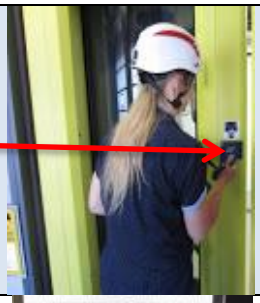


Figure 10 – CERN operational dosimeter reader

6. ACCESS

6.1 ENTERING CHARM

	Steps	
	⚠ As well as the necessary PPE, both dosimeters need to be worn when entering CHARM.	
□	After reading the dosimeters, go to the control panel shown.	
□	Here the CERN dosimeter is placed against the reader, which is then sent to the CERN control centre (CCC) for approval.	 
□	After the request is granted, one of the 16 keys will light up, prompting it to be taken from the control panel.	

□	Next, by putting the CERN dosimeter against to the reader for the PAD (Personal Access Door), the first door opens	
□	Once inside, an eye test is taken as shown to confirm the identity you set up in the biometry. Once this has been completed, a voiceover will prompt you to put the key in the slot below the eye scanner. Turning the key opens the other door, allowing access to the facility.	
	NOTE: Sometimes, the voiceover can ask you to move a little back in order to be able to properly perform the iris scan	

7. REFERENCES

[1] M.Brugger, "Target and control functional specifications for the PS-EA mixed-beam irradiation facility (MIF)," EDMS 1282369.

[2] C.Lemesre, "CHARM Demonstrative part," EDMS 1353140.

[3] C.Lemesre, "Operating procedure : Access to CHARM," EDMS 1390499.

[4] APAVE, "Annexe 1-Rapport APAVE CHARM MONTRAC," EDMS 1390490.

[5] D.Patrzalek, "CHARMs maintenance schedule," EDMS 1405154, [Online]. Available: https://edms.cern.ch/file/1405154/3/CHARMs_maintenance_schedule.xlsx.

[6] D.Patrzalek, "CHARM technical data sheet," EDMS 1405154, [Online]. Available: https://edms.cern.ch/file/1405154/3/CHARM_technical_data_sheet_V03.docx.