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OPERATING PROCEDURE

ACCESS TO CHARM

ABSTRACT:

This aim of this procedure is to describe the good practices CHARM users should apply to access and exit the CHARM facility. The access conditions needed are also presented.

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1. INTRODUCTION

1.1 SCOPE OF THE PROCEDURE

This procedure is addressed to users who need to access the CHARM facility.

This document is devoted to:

- The access to the CHARM access corridor, the patch-panel area, the target area and CHARM Hot buffer zone when there is no beam sent to the facility (the access to the control room, the technical local and the motors room are not treated);
- The access to the CHARM facility in «normal operation period» (the access in «shut-down period» is not treated).

The two facilities CHARM and IRRAD, located one next to the other, are accessible through the same access system (PAD-MAD). However, this document is devoted to CHARM only.

A complete description of the CHARM facility is available in the Safety Documentation for CHARM – Descriptive part and Demonstrative part [1] [2].

Information regarding users and visitors can be found on the CHARM website (<http://charm.web.cern.ch>).

1.2 LOCATION AND LAYOUT OF THE CHARM FACILITY

The CHARM facility is located in the East Area - building 157 (Figure 1, Figure 2).

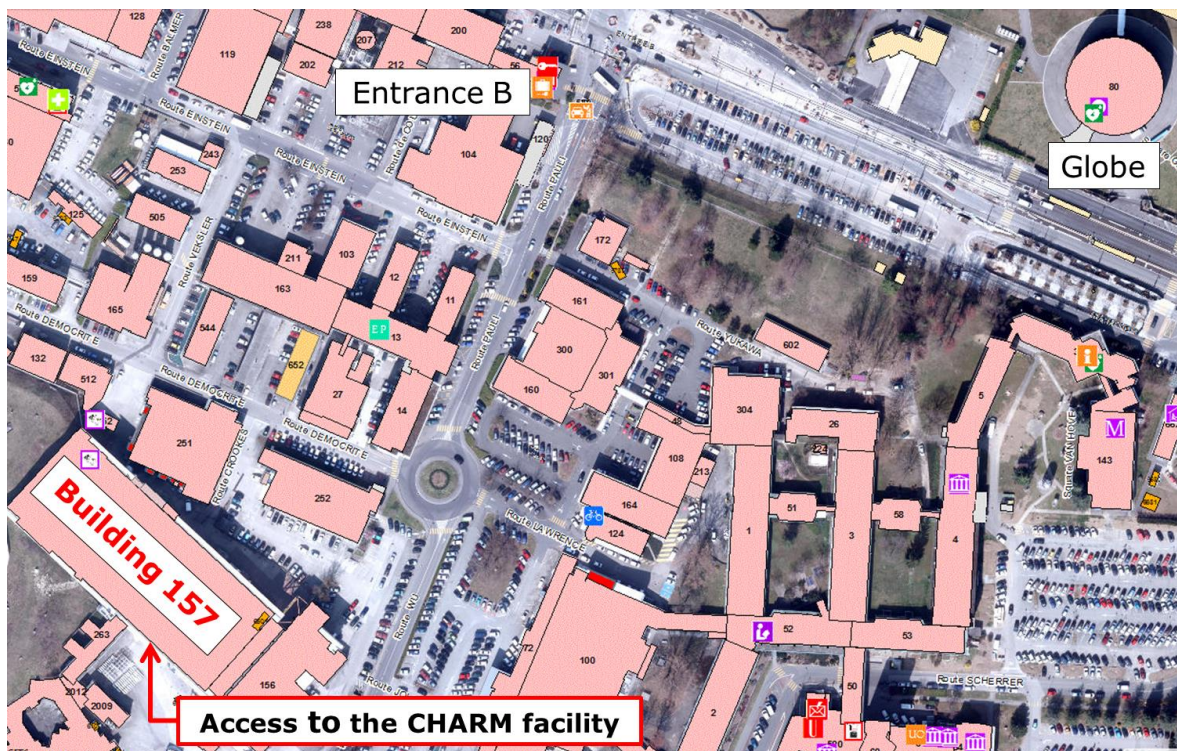


Figure 1 : Access to the CHARM facility (map).

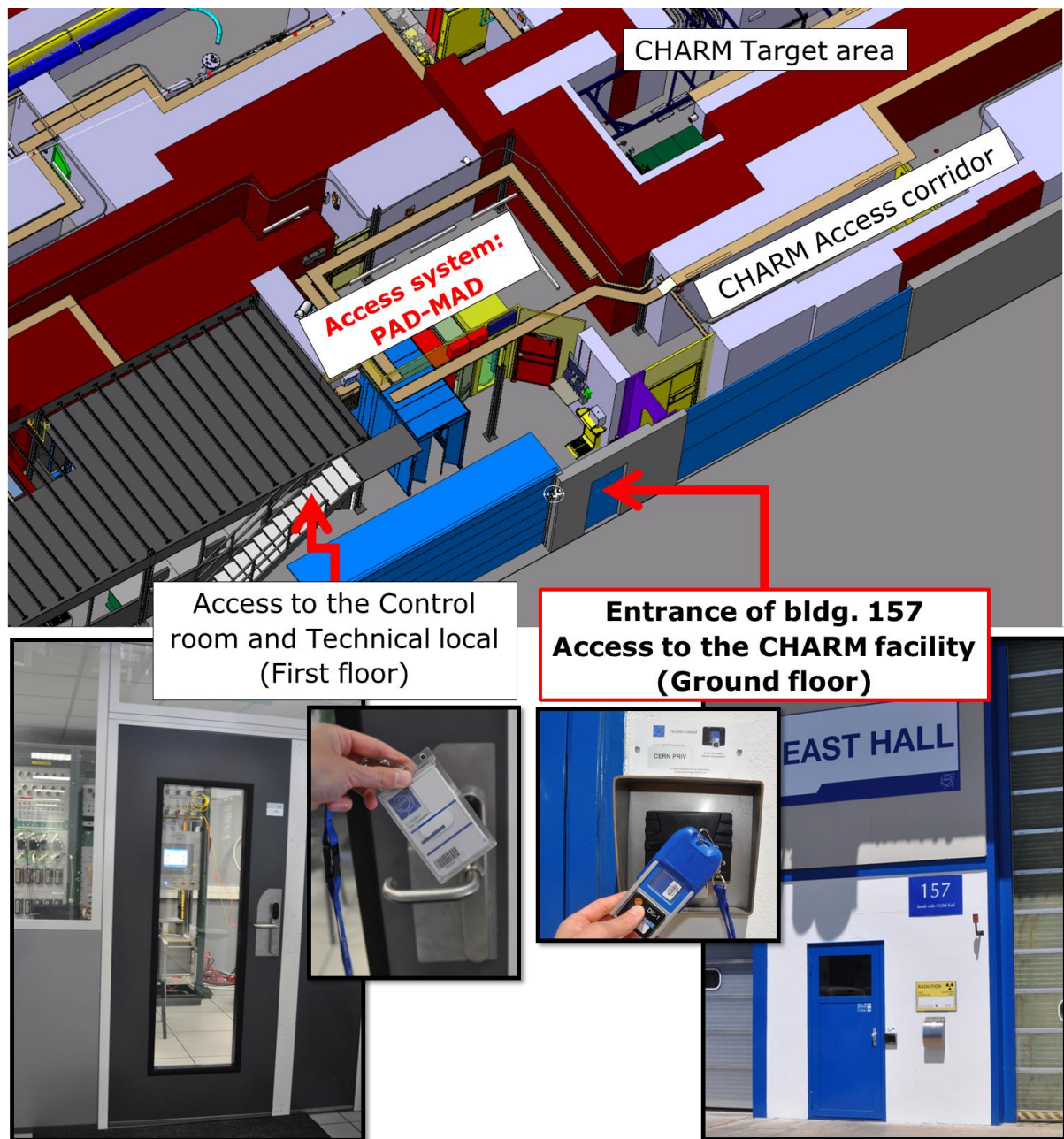


Figure 2 : Access to the CHARM facility (layout of the entrance).

The layout of the CHARM facility is shown on Figure 3.

The facility can be divided in four different zones: the access corridor, the patch-panel area, the target area, and CHARM Hot buffer zone.

Three doors are present in the CHARM facility: the sector door, the ventilation door, and the CHARM Hot buffer zone entrance door.

The CHARM area classification is shown in Table 1. Lines drawn on the floor determine the criticality of the several areas from a Radiation Protection point of view.

Table 1 — CHARM area classification.

	Beam on	Beam off
CHARM Target area	Prohibited Area	Controlled Radiation Area – Limited Stay
CHARM Patch-panel area		
CHARM Access corridor		
CHARM Hot buffer zone		

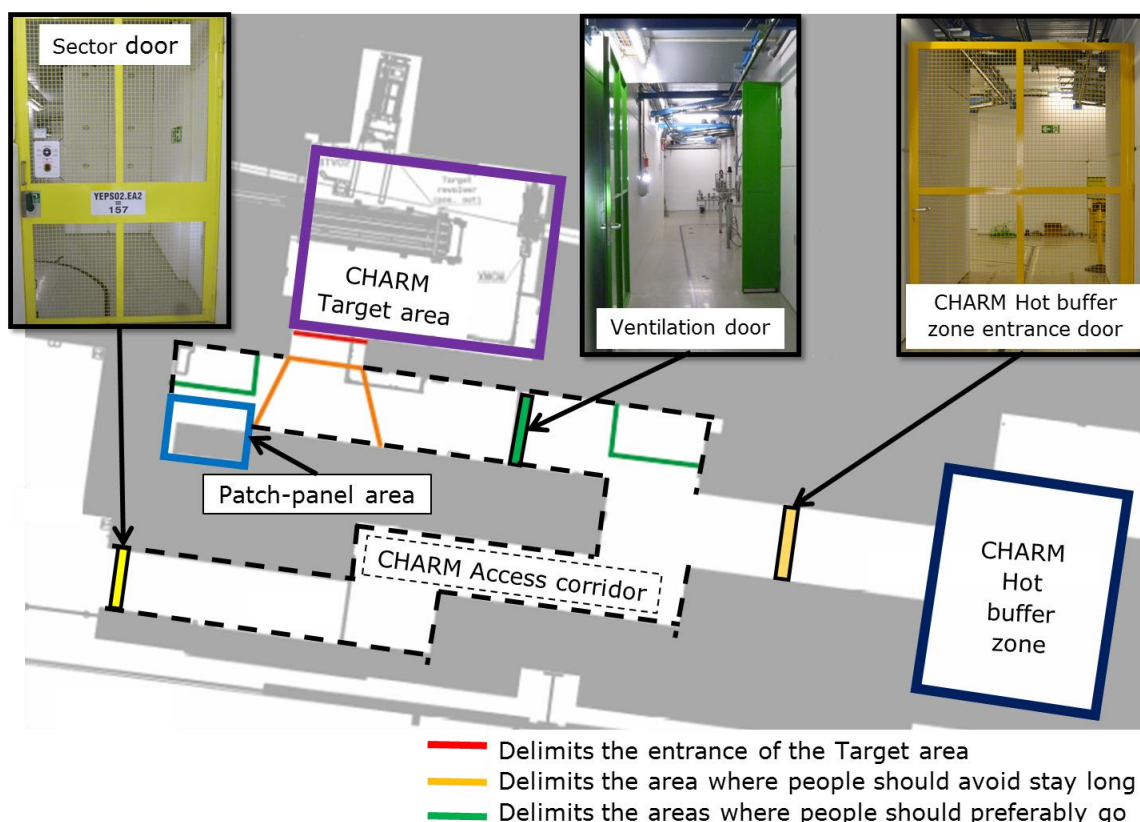


Figure 3 : Layout of the CHARM facility.

2. PREREQUISITE

2.1 ADMINISTRATIVE PREREQUISITE

2.1.1 DOSIMETRY

Users have to be registered at CERN, and must wear a personal and an operational dosimeter (Dosimetry service, 55/R-004, <http://dosimetry.web.cern.ch/>) [3]¹.

Five pool operational dosimeters are available for users in the control room².

¹ The personal dosimeter is needed to open the door of building 157 (Figure 2).

² A CERN card with the respective access rights («0157-1-N26: Preparation Room CHARM» and «0157-1-N28: Control Room CHARM») is needed to open the door of the Control room and the Technical local (Figure 2).

2.1.2 MANDATORY SAFETY COURSES

Users who want to access the CHARM facility should follow and validate safety courses. The mandatory safety courses to be followed depend on the area users want to access (see Figure 3 and Figure 4) and are presented in the next table.

Table 2 — Mandatory safety course to access the CHARM facility.

Mandatory safety courses	Area users want to access		
	Patch-panel area	Hot buffer zone	Target area
E-learning courses ³ - <i>Sir application</i> (https://sir.cern.ch)			
CERN Safety Introduction	X	X	X
CERN - Beam Facilities	X	X	X
Radiation Protection - Supervised Area	X		
CHARM – ISS	X	X	X
Classroom courses - <i>Inscription on EDH</i> (https://edh.cern.ch), <i>CERN safety training catalogue</i>			
Radiation Protection (Controlled Area – CERN Employees and Associates)		X	X
Instruction on site with CHARM responsible			
Instruction on site	X	X	X

Users who didn't validate the Radiation Protection (Controlled Area – CERN Employees and Associates) safety course and required to access the Patch-panel area (blue zone in Figure 4), **must be accompanied all time during the access by at least one of the CHARM operation team members.**

Users who didn't validate the safety courses required to access the target area are not allowed to cross the red line delimiting the entrance of the target area (Figure 4).

Users who didn't validate the safety courses required to access the CHARM Hot buffer zone are not allowed to go through the fence door delimiting the entrance of the CHARM Hot buffer zone (Figure 4).

³ The SIR e-learning course «Radioactive Equipment - Traceability – TREC» is not mandatory but it can be useful to the user of the CHARM facility.

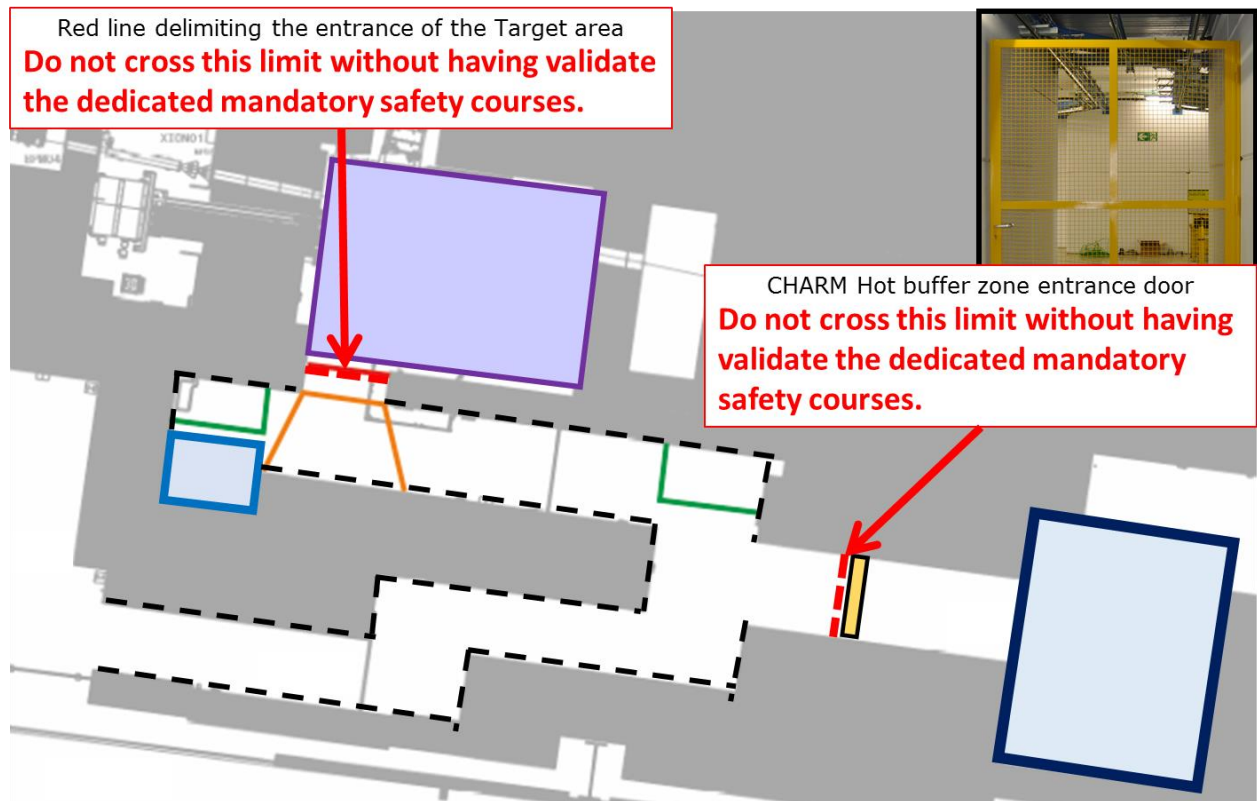


Figure 4 : Limits not to be exceeded by users who didn't validate the dedicated mandatory safety courses.

2.1.3 ACCESS AUTHORIZATION

Users who want to enter the CHARM facility should make an access request on EDH (<https://edh.cern.ch>). Fill in the Line-item editor as shown on Figure 5 requesting the << **IRRADS – Irradiation Facilities in East Area** >> permission.

CERN Home > GS Department

EDH

Home | Tasks | Search | News | Settings | Whats New | Statistics | About | Help | Logout

Tasks

Other Tasks | Absence Request | **Access Request**

Request access

Person

Permission: IRRADS | Irradiation facilities in East Area

Start date: 15-Mar-2023 00:00

End date: 13-Mar-2028 00:00

Reason:

Alert on completion of EDH document: ☐

Back | Create request | Create and create another

Figure 5 : Access request.

2.2 SAFETY

2.2.1 LOCATION OF THE HAZARDS

The main hazards present in the CHARM facility during access are the radiological hazards due to activation of the material and target presence and the mechanical hazards due to moving equipment.

Those hazards are localized in Figure 6.

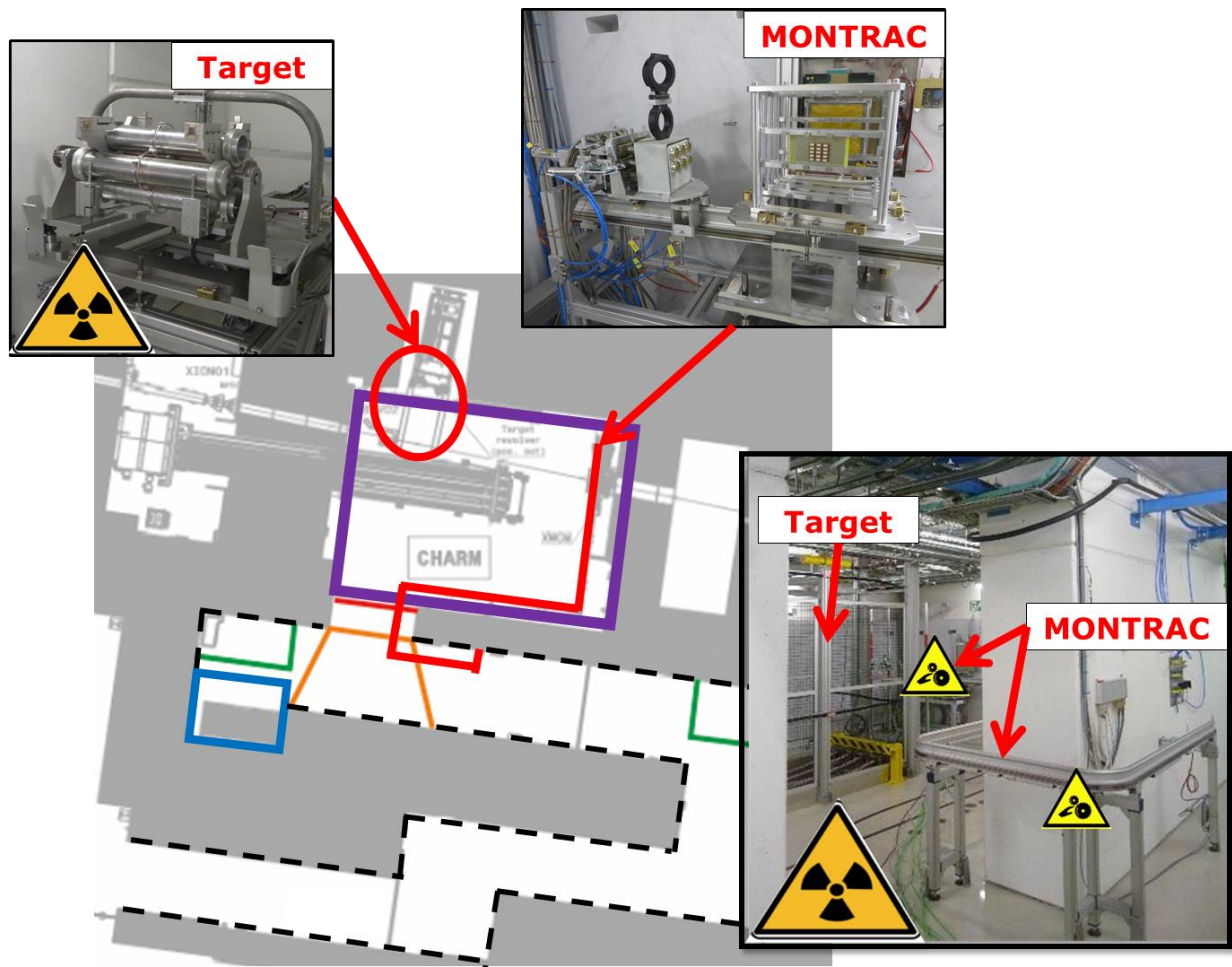


Figure 6 : Main hazards in the CHARM access corridor and target area.

More information can be found in the document Safety documentation for CHARM [2].

2.2.2 ACCESS CONDITIONS

The access conditions before intervention in the area will be the following:

- Radiation Protection (HSE/RP) is called⁴.

Users should ask the CHARM responsible.

⁴ 72504 during working hours or 74848 HSE/RP on-call service outside working hours

In the case of a scheduled intervention HSE/RP should be called 48 hours in advance, to define the required waiting time before access (decay), when the target will be retracted into the storage area and when the beam will be stopped.

In the case of a non-scheduled intervention HSE/RP should be called as soon as possible.

- Beam is stopped.

Users should call the CHARM responsible who – in agreement with the IRRAD operation team - calls the CCC to stop the beam and request access. The CCC will put the EIS-beam in safe and locked position.

- Access system is switched to "access mode".

The CCC will switch the access system to "access mode". If the previous mode was "beam on" with the EIS-beam unsafe for more than one minute, this operation will automatically be preceded by a "purge mode" of the ventilation system maintained for 30 minutes. No access is possible before the end of this purge. This waiting time should be anticipated. Switching to access mode should be done in time (Figure 7).

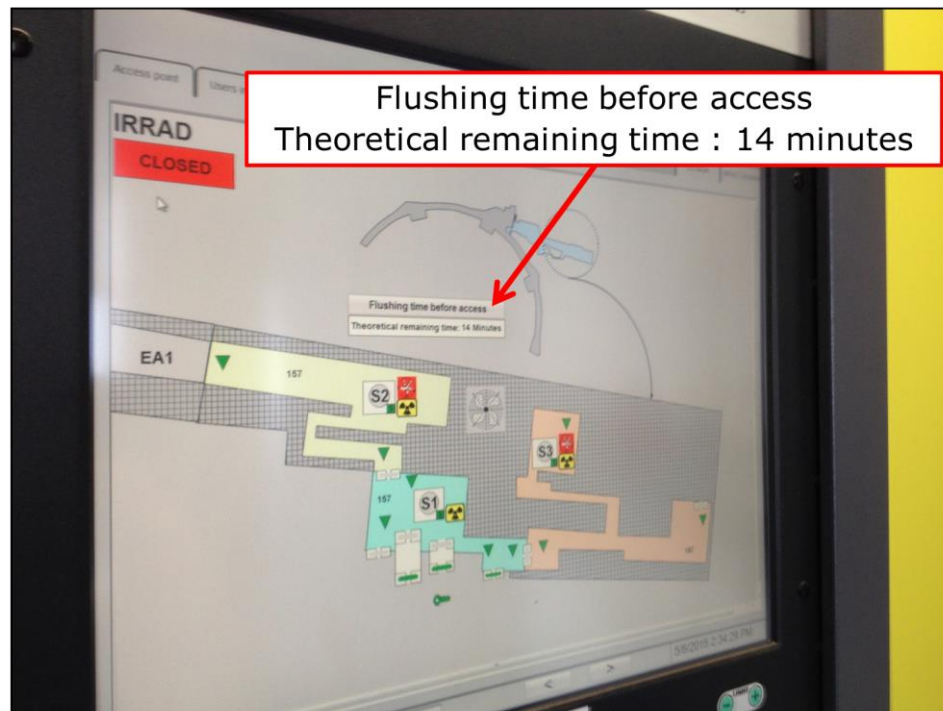


Figure 7 : Flushing time before access on the PAD-MAD screen.

The CHARM responsible or the shifter must be present during the intervention/access.

- Targets are retracted into the storage area.
- Marble shielding door is closed.



- Four mobile shielding layers are put in optimal position⁵.
- Lights are turned on.
- Radiation protection VETO (RP VETO) is removed.

HSE/RP⁶ removes the VETO on site and if required makes a radiation survey at the working position.

- PAD/MAD is switched to "restricted mode" (meaning "access mode").

From this point and only after **all the conditions mentioned above are fulfilled**, the user can access the zone with at least one of the CHARM operation team members and, if required, an HSE/RP member.

2.2.3 PREPARATION OF THE INTERVENTION

Users who want to access the CHARM facility should prepare their intervention. That means limiting the intervention time therefore reducing their exposure to radiation.

An IMPACT is required (<https://impact.cern.ch>)⁷ and its preparation of it is coordinated by the CHARM team responsible.

For interventions inside the target chamber and above Level 1 according to the ALARA criteria, a Work and Dose Planning (WDP) has to be established. Users should define their intervention in advance:

- Location, date/hour of the intervention
- Kind of intervention
- Necessary equipment and tools
- Workers' names

A WDP template is available on <https://impact.cern.ch> by clicking on the "Create Work Dose Planning" button on the left-hand side Menu of the IMPACT screen. The preparation of the WDP of it is coordinated by the CHARM team responsible.

2.2.4 PERSONAL PROTECTIVE EQUIPMENT

Entrance to the CHARM facility has to be done in presence of HSE/RP.

The PPE you should wear to enter the CHARM facility are the following:

- Helmet
- Safety shoes
- Personal and operational dosimeter

⁵ See table 3.

⁶ 72504 during working hours or 74848 /RP on-call service outside working hours

⁷ External users should use the dedicated specific IMPACT number.

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

3. ACCESS THE CHARM FACILITY

3.1 PAD-MAD

Prior to the access, users must switch-on their Operational Dosimeter (DMC) on the reader (Figure 8) with a valid IMPACT number⁸.

Then, to enter the CHARM facility, users must access through the PAD-MAD (Figure 8). The general procedure for access through the PAD-MAD is explained in the video: <https://cds.cern.ch/record/1648634>.

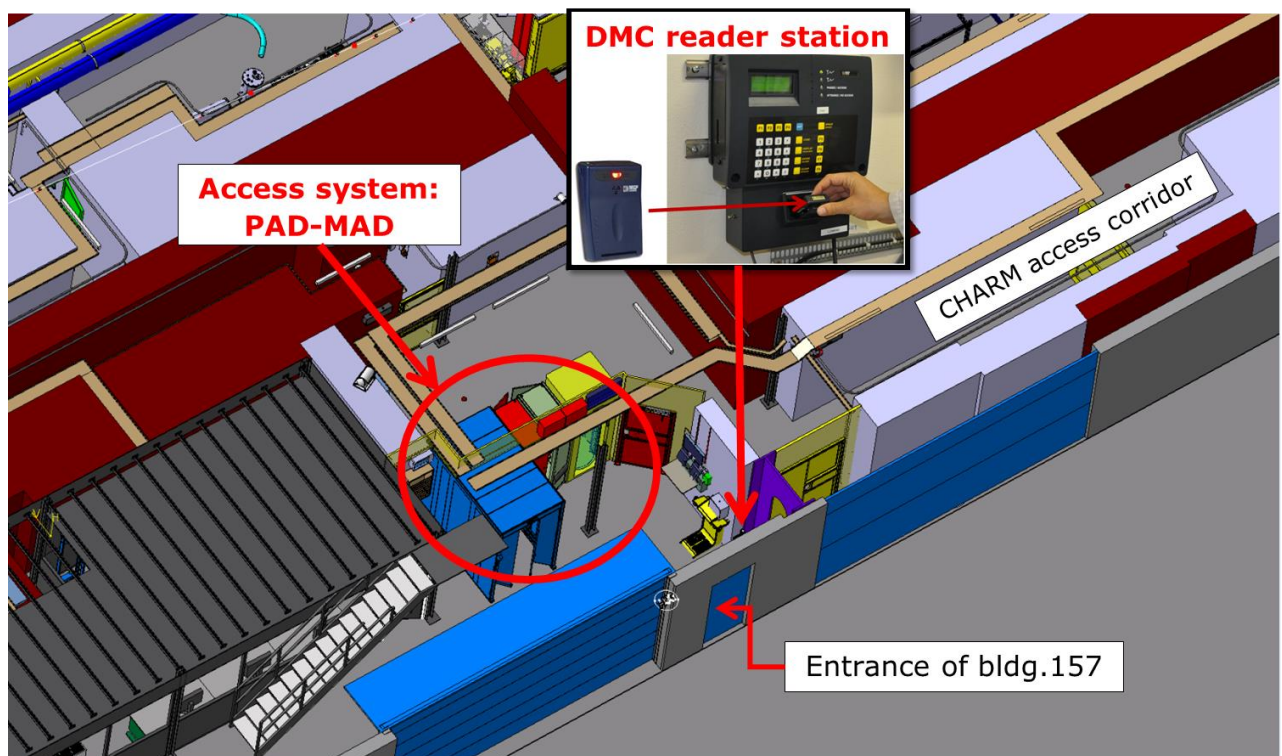


Figure 8 : DMC reader station and PAD-MAD.

3.2 ACTIVITIES REQUESTING ACCESS

The next table gives the different types of activity requesting access to the CHARM facility together with the state in which the main equipment of CHARM should be to allow access.

⁸ IMPACT numbers to be used for most of the interventions are put on display near the DMC reader.

Table 3 — Equipment's state for access.

	4 mobile shielding layers		Movable table and Target		Marble Shielding door		MONTRAC Test box		Radio remote controlled transporter		Sector door		Ventilation door	
	Deployed	Retracted	Beam position	Retracted position	Opened	Closed	Access corridor	CHARM Hot Buffer Zone	Inside the facility	Outside of the facility	To open at the time of access	To open before access	To open at the time of access	To open before access
Access to install new electronic card (MONTRAC)	x			x		x	x			x	x		x	
Access to install new systems or electronics crate (Radio remote controlled transporter, Semi-automatic)	x			x		x		x	x		x		x	
Access to install new systems or electronics crate (Radio remote controlled transporter, Fully-automatic)	x			x		x		x	x			x		x
Access to install both new electronic card and new systems or electronics crate (Semi-automatic)	x			x		x	x		x		x		x	
Access to perform the patrol (done by BE/OP)		x		x	x			x		x	x		x	

To open the sector door and the ventilation door users should press the green button and pull on the door. Users shouldn't pull the door handle because this would break the patrol. These doors should absolutely be closed at the end of the access.



Figure 9 : Opening of sector door and ventilation door.

4. EXIT THE CHARM FACILITY

4.1 EXIT OF PERSONNEL

To exit the CHARM facility users should (Figure 10):

- Exit the CHARM access corridor through the PAD (don't forget to put back your key: if one key is not in the lock, it will be impossible to send the beam again).
- Control themselves with the hand-foot monitor at the entrance of the CHARM facility.
- Switch-off the Operational Dosimeter (DMC) at the DMC reader station.

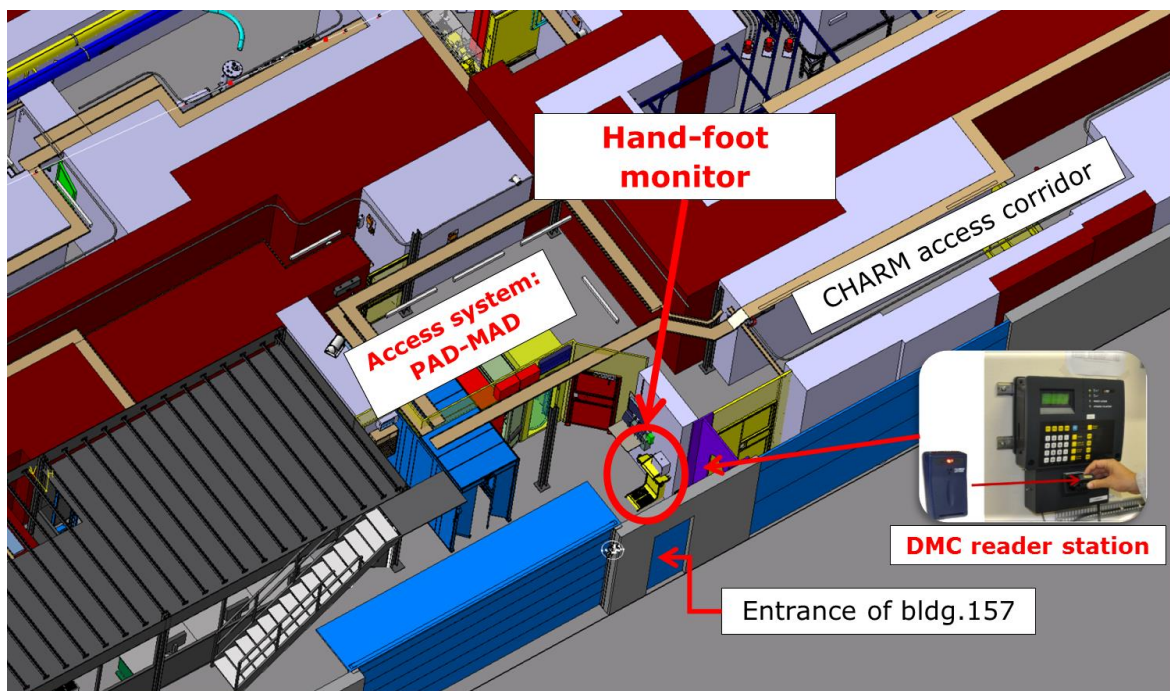


Figure 10 : Hand-foot monitor.

4.2 EXIT OF MATERIAL

Tools, materials, and packages that enter the CHARM facility won't necessarily be radioactive when they will leave the area.

Tools and materials that were not in the CHARM facility during the beam operation can be exited through the MAD without being controlled by HSE/RP.

Tools and materials that were in the CHARM facility during the beam operation should be checked by the CHARM responsible or the shifter⁹ and should be put in:

- The RP buffer zone (Figure 11) if the dose rate is $< 50 \mu\text{Sv/h}$ at 10 cm;
- The CHARM hot buffer zone (Figure 11) if the dose rate in $> 50 \mu\text{Sv/h}$ at 10 cm.

Then they should be registered in the TREC system (<http://trec.cern.ch>). They will be checked by HSE/RP and labeled afterwards.

Users should reduce the quantity of material that they bring into the CHARM facility: take only the necessary elements to limit the number of radiological controls.

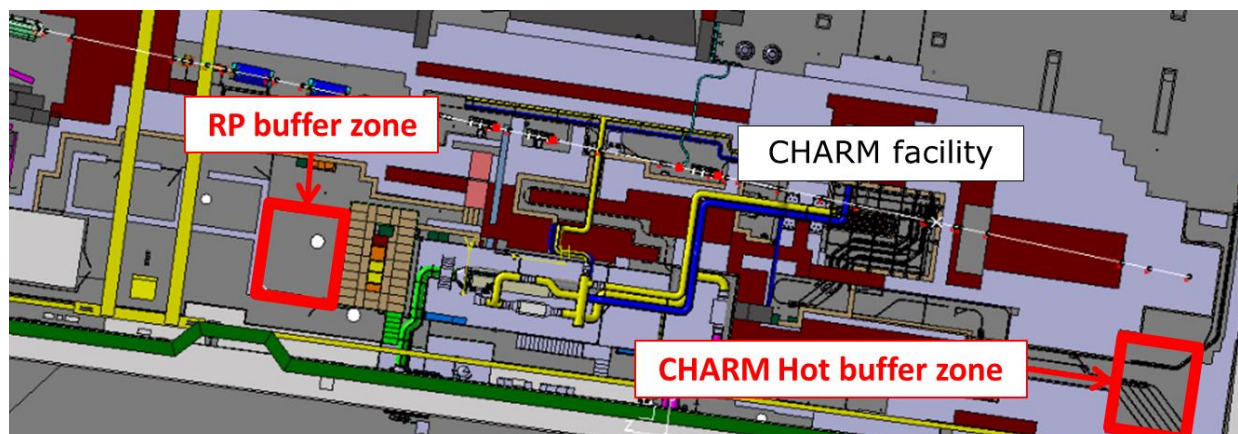


Figure 11 : Buffer zones.

4.3 RADIOACTIVE WASTE

Users must not mix the radioactive and non-radioactive waste: the sorting and the conditioning of the waste must be done in consultation with HSE/RP.

Small combustible, metallic or electronic radioactive waste should be thrown in the trash bins available behind the PAD-MAD (Figure 12).

Voluminous radioactive wastes should be checked by the CHARM responsible or the shifter¹⁰ and should be put in:

- The RP buffer zone (Figure 11) if the dose rate is $< 50 \mu\text{Sv/h}$ at 10 cm;
- The CHARM hot buffer zone (Figure 11) if the dose rate in $> 50 \mu\text{Sv/h}$ at 10 cm.

⁹ AD-6 available in the Control room.

¹⁰ AD-6 available in the Control room.

Then they should be registered in the TREC system (<http://trec.cern.ch>). They will be checked by HSE/RP and labeled afterwards.

Users are responsible for the evacuation of their waste and should ensure to make a Transport request on EDH (<https://edh.cern.ch>).

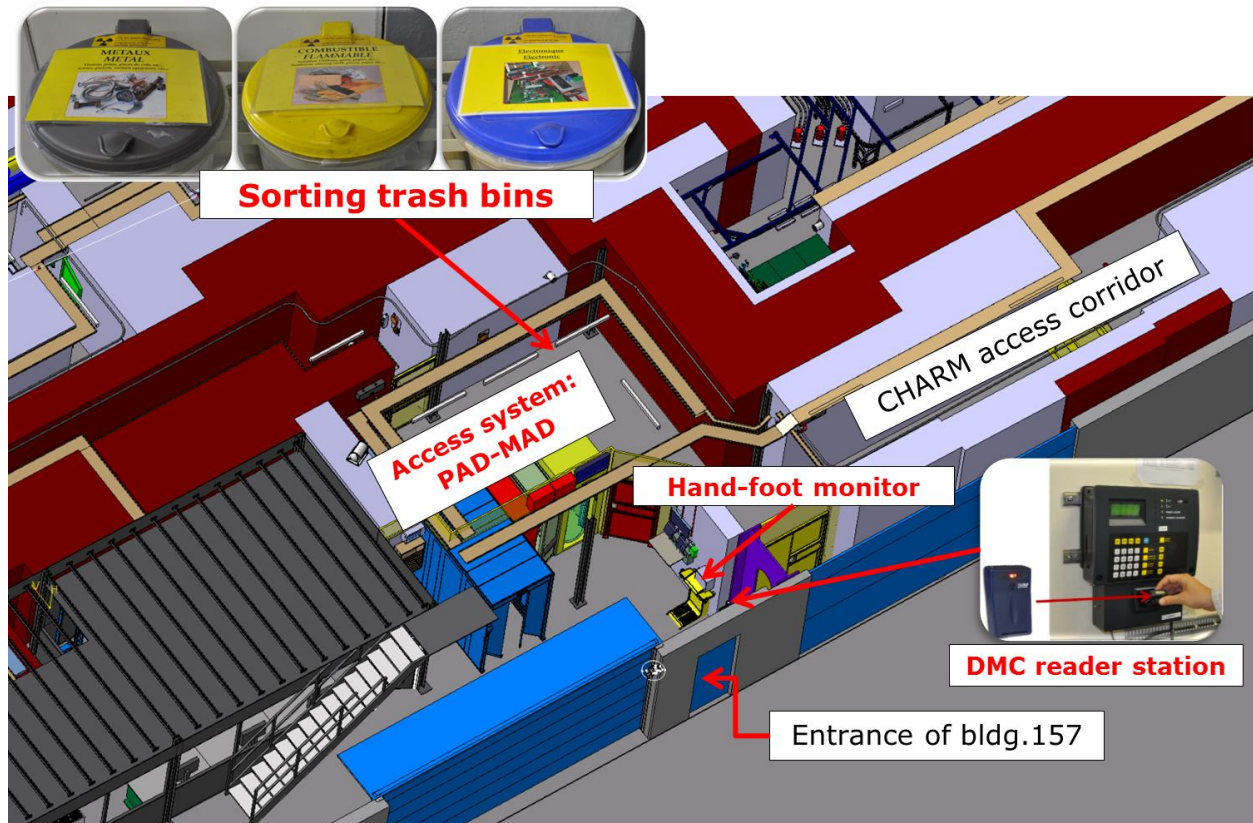


Figure 12 : Sorting trash bins.

4.4 BEFORE « BEAM ON » MODE

Before sending the beam back:

- Any material that has been brought into the CHARM facility during the access has to be taken out unless its presence is required for the measurements to be performed.
- The ventilation door and the sector door should be closed.
- The key system on the PAD-MAD enables to ensure that everyone has exited the zone.

From this point and only after **all the conditions mentioned above are fulfilled**, the «Beam on» mode can be activated. The RP veto back is set automatically if beam conditions area applied (EIS unsafe) for more than 1 min.



5. REFERENCES

- [1] D. Phan, F. Ravotti, S. Danzeca and J. Lendaro, "CHARM Safety File - Descriptive Part," CERN, EDMS 1352782.
- [2] C. Lemesre, F. Ravotti, S. Danzeca and J. Lendaro, "CHARM Safety File - Demonstrative Part," CERN, EDMS 1353140.
- [3] D. Forkel-Wirth, "Zonage radiologique au CERN," EDMS 810149.