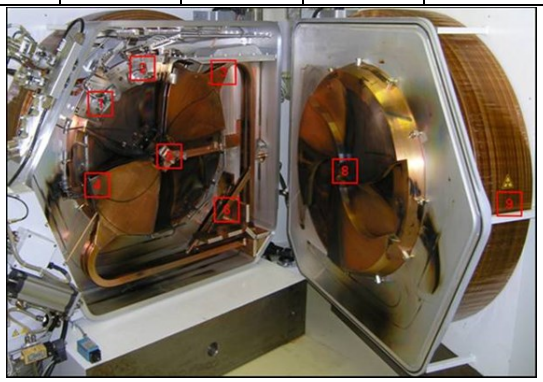
MAINTENANCE TRACKING TOOL

Chamber

Survey	Date:					Time:				
EOB	Date:		Time:			H:		Time after EOB in hour :		
Survey point	1	2	3	4	5	6	7	8	9	10
Probe dose rate (mSv/h)	0	0	0	0	0	0	0	0	0	0



Targets

• Disconnect all targets from the service PC

• Switch off the manual water valves to the targets on the water manifold (the large wall mounted water manifold)

NOTE! 18F2 Deuteron target system requires NEON gas flushing before opening of connections.

NOTE! 18F2 Proton target system requires ARGON gas flushing X 3 before opening of connections.

NOTE! Do not disconnect the C11CH4 target, any atmosphere entering this target may ruin the target.

• Physically disconnect all targets from the cyclotron and transport them to safe/shielded location

• Verify condition and functionallity of the beam exit valves (BEV), repair or replace as required

BEV & Compressed air Tubing: annual replacement for BEV/ 3 years replacement for air tubing

Target position	**T1**	**T2**	**T3**	**T4**	**T5**
Date of the last BEV replacement:					
Action Performed (Y/N)					
Date of the last compressed air tubing replacement					
Action Performed (Y/N)					

Cyclotron

WARNING! Pinch hazard.
• Check the screws between yoke actuator and cyclotron's chassis: remove them, inspect for damage and if damaged replace them, otherwise put them back.

• Remove the magnet door bolt, inspect for damage. If damaged repair or replace, otherwise regrease to make it prepared for installation.
• Verify the magnet door functionality, the play between the yoke and the magnet, re-adjust as required, record play

Yoke to magnet play		
Recorded play (mm):		**Limit 2-10mm**

RF flaps

• Verify flap and flap drive function, calibrate, repair and/or replace as required, read and record the current

Flap motor current		
	Flap 1	**Flap 2**
Recorded current (mA):	0	0

• Verify the flap to DEE play, readjust as required, read and record

Flap to DEE play				
Flap number	**0% (4mm +0,5/-0)**	**50% (>4 - < 2mm)**	**100% (>26mm)**	**Working Position**
1:				
2:				

Central region

• Verify the DEE tip condition, replace if worn and/or damaged

NOTE! This action is only to be executed if the Ion-Source requires maintenance and/or replacement.
NOTE! Ion-Source maintenance may require paper burn to verify beam position in target.
• Read and record ion source adjustment, replace the anode assembly (ion source 'block' with anode/s and cathodes), re-read and record the adjustment

Ion source adjustment (with dummy anode)

Location	Recorded distance (mm) After	Typically (mm)
A:		0,9-1,2
B:		0,3-0,5
C:		0,4-0,6
D:		1,1-1,3

• Verify flip-in probe condition, position, insulation and functionality, reposition and/or replace as required, read and record

Flip-in probe insulator surface reading

Recorded reading (kΩ):	Typically 29,4kΩ	

• Read and record DEE settings, adjust as required (refer to original factory settings, if adjusted re-read and record

DEE settings

Measurement point	Height (mm)	Thickness (mm)	Theoretical midplane from pole (mm)	Actual midplane from pole (mm)	Variance (max 0,5mm)
Dee1 tip top (A):	0.00	0.00	30		
Dee1 upper corner (B):	0.00	0.00	58		
Dee1 lower corner (C):	0.00	0.00	30		
Dee1 tip lower (D):	0.00	0.00	30		
Dee2 lower tip (E):	0.00	0.00	58		
Dee2 lower corner (F):	0.00	0.00	30		
Dee2 upper corner (G):	0.00	0.00	58		
Dee2 upper tip (H):	0.00	0.00	58		
Stem 1 (I)	0.00	NA			
Stem 1 connecting block (J)	0.00	NA			
Stem 2 (K)	0.00	NA			
Stem 2 connecting block (L)	0.00	NA			

NOTE! Do not touch or clean the DEE pick ups.

• Verify thightness of the DEE and the stem screws, re-tighten if required

Extraction

- Verify foil condition, in case of >3 broken foils; replace the carousel and transport the replaced unit to a safe/shielded location for decay
- Verify functionality and status of the limit switches, repair and/or replace as required
- Verify capton cable condition, repair and/or replace as required
- Verify carousel turn mechanism functionality, repair and/or replace as required
- Verify that the carousel insulation, repair and/or replace as required, read and record resistance

Carousel insulation (ground resistance)	
Recorded resistance extraction 1 (carousel to carrier) (kΩ):	**Typically 29.4kΩ**
Recorded resistance extraction 2 (carousel to carrier) (kΩ):	**Typically 29.4kΩ**
Recorded resistance extraction 1 (cable to carrier) (kΩ):	**>500kΩ**
Recorded resistance extraction 2 (cable to carrier) (kΩ):	**>500kΩ**

- Verify extraction drive mechanism functionality, the balance functionality, repair and/or replace as required, calibrate, read and record the motor current

Extraction and balance motor current	
Maximum recorded current extraction 1 (mA):	**Limit 50-200 mA**
Maximum recorded current extraction 2 (mA):	**Limit 50-200 mA**
Maximum recorded current balance (mA):	**Limit 100-300mA**

Collimators

- Verify collimator condition, openings, re-adjust, repair and/or replace as required, read and record insulation

Collimator readings

Collimator position	Insulation (recorded ground resistance) (typically 29,4kΩ)	Horizontal opening (mm)	Vertical opening (mm)
1 (lower)	0	0	
1/2	0	0	
2/3	0	0	
3/4	0	0	
4/5	0	0	
5/6	0	0	
6 (upper)	0	0	

- Verify target clamps insulation, repair and/or replace as required, read and record insulation

Target clamps insulation (ground resistance)

Target clamp position	Recorded resistance (typically 20,4kΩ)
T1	
T2	
T3	
T4	
T5	
T6	

Tank

- Verify that no parts are; burned, covered by aluminum oxide (sputtered), foreign material and/or other contamination, replace parts as required and document by photo
- Verify that no damage, contamination and/or deformation are present on the vacuum tank o-ring, replace as required, otherwise clean and regrease
- Verify that the finger contacts are properly secured in place and that no damage and/or deformation are present, reinstall and/or replace as required
- Verify that the silicon baffles are properly fitted and tightly secured at their locations and that no damage are present, tighten and/or replace as required
- Verify that the the screen plate and the screws for the covers at the top right inside of the tank are securely attached and that no damages are present, if required tighten and/or replace

Water cooling	• Switch on the secondary water cooling (Swedewater), let it run for at least 10 minutes, verify normal operation' • Verify that no leaks are present on the water manifold (target panel), the magnet connections, the RF system, the ion-source system, the PSMC, repair and/or replace as required • Verify the condition of the water cooling lines for the targets, if hard or brittle, replace as required • Turn off the main water cooling pump on the secondary water cooling system (Swedewater) (optional: perform only in case of cooling problems) • Inspect and replace filter Z2 at the Swedewater (optional: perform only in case of cooling problems) • Inspect and clean filter Z1 and Z3 at the Swedewater (optional: perform only in case of cooling problems) • Verify water conductivity and flow at the Swedewater, if conductivity error has occurred/occurrs during production, replace the ion exchanger resin (normally once a year) • Off mode: Verify water level and pressure at the Swedewater, re-fill and/or adjust as required, read and record

Secondary water cooling system (Swedewater) system off data	
Water volume filled (ml):	**If fill is not required, mark N/R**
Static pressure compressed air (kPa):	**Limit 40-200 kPa**

• On mode: Verify water cooling system readings, adjust as required, read and record

Secondary water cooling system (Swedewater), system on data
Expansion vessel BP1 (bar):
Main pump pressure BP2 (bar):
Vacuum cooling pump BP3 (bar) (if present):
System temperature BT1 (degree C):
Temperature alarm (degree C):
Cooling water out temperature BT2 (degree C):
Cooling water in temperature BT3 (degree C):
Deonizer flow BF10 (liter/min):
Conductivity BQ1 (µS cm-1):

Targets	• Replace LTF peek (Optional operation) • Verify the condition of the water cooling tubes, if hard or brittle, replace as required
Annual maintenance: Check of the PDU terminal screws	For the PDU, yearly check to be done: • If Vacuum still OFF, stop the swedewater pump and then turn off the power of the PDU • Put the gloves and helmet for electrical interventions • Check and if needed tigthen the terminal screws inside the PDU
End of inside-bunker operations	• Install the paper burn target • Verify the sealing of the target gasket • Close the bunker before restart the vacuum

Comments:	
PHOTO:	