



## MAINTENANCE TRACKING TOOL

### PETTRACE800

Date:2023-10-31

<b>Country:</b> Iberia	<b>Site:</b> BAR
<b>Intervention:</b>	Programmed maintenance: UBM/CBM <input checked="" type="checkbox"/>
<b>Subsystems:</b>	

### PRE-MAINTENANCE

Registration Date: 2023-10-3100

Gas flow(sccm): 6.0

#### TPG Settings Verifications

	Low limit (x10-)	High limit (x10-)
<b>Piranni 1 (TPG300 A1):</b>	1.60E+0	1.76E+0
<b>Piranni 2 (TPG300 A2):</b>	2.65E+0	2.99E+0
<b>Penning:</b>	4.65E+0	5.21E+0

#### Notes

Notes Piranni
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Gauge number	Pressure (x10-) without gas	Pressure (x10-) with gas
<b>A1 (mbar):</b>	3.455	4.123
<b>A2 Under Range:</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>A2:</b>		
<b>B1 (mbar):</b>	4.111	6.845

#### System software

Subsystem	Version
<b>Master:</b>	9
<b>ACS:</b>	4.5
<b>Service System:</b>	3.68
<b>Manager:</b>	465
<b>Informix (only applicable to SUN-Master Station):</b>	111

Comments

Comments pre-maintenance

Paper Burn Before PM

Photo1

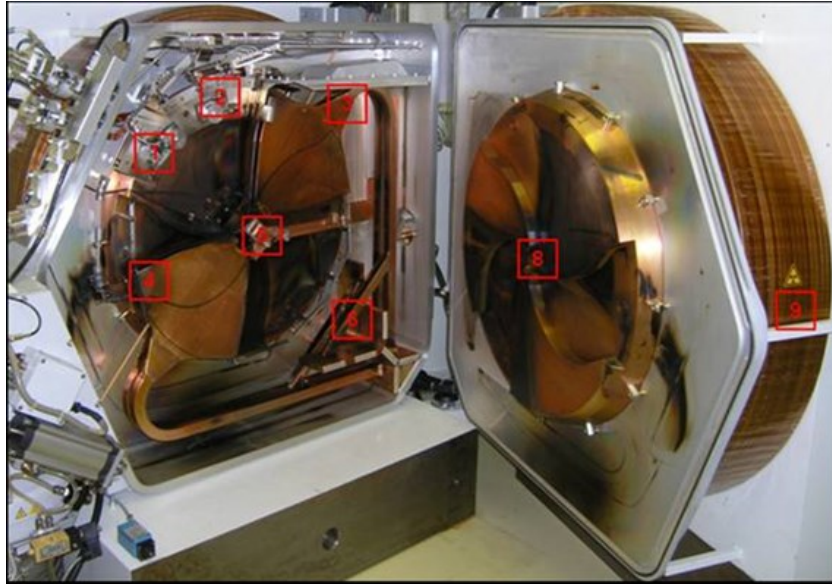
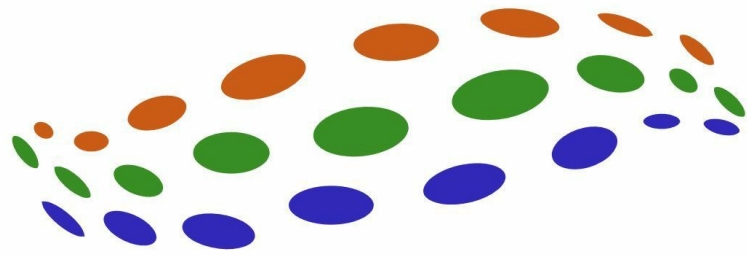


Photo2



**MOTUM**  
S T O R E

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**VACUUM**


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**TPG settings verifications**

Date: 2023-10-31

Production gas flow: 5.0

Piranni 1 (TPG300 A1)

Pressure with gas	Low limit (x10-)	High limit
1.60E+1	1.60E+0	1.80E+0

Piranni 2 (TPG300 A2)

Under range	Pressure with gas	Low limit	High limit
<input checked="" type="checkbox"/>	0.00E+0	2.01E+0	2.03E+0

Penning

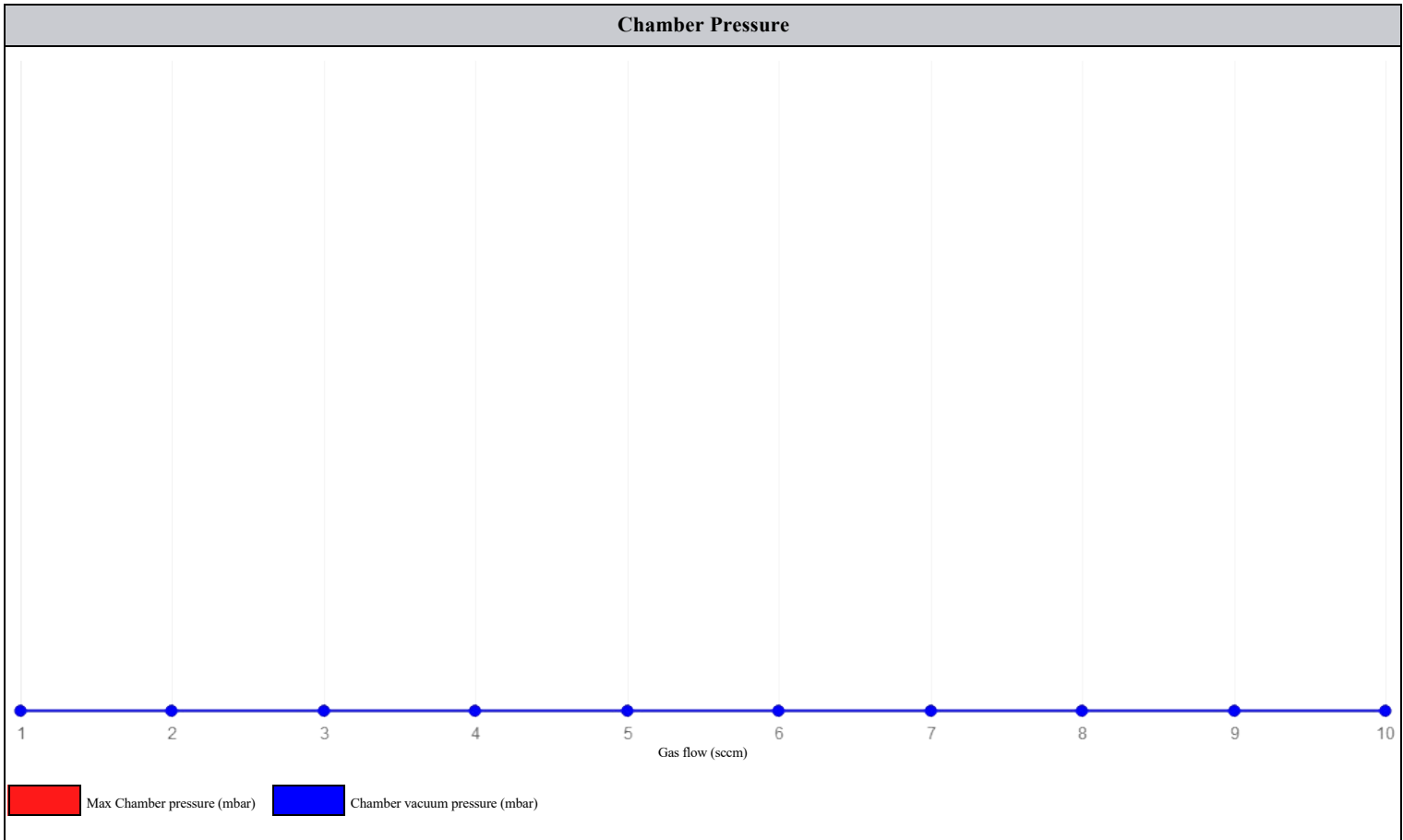
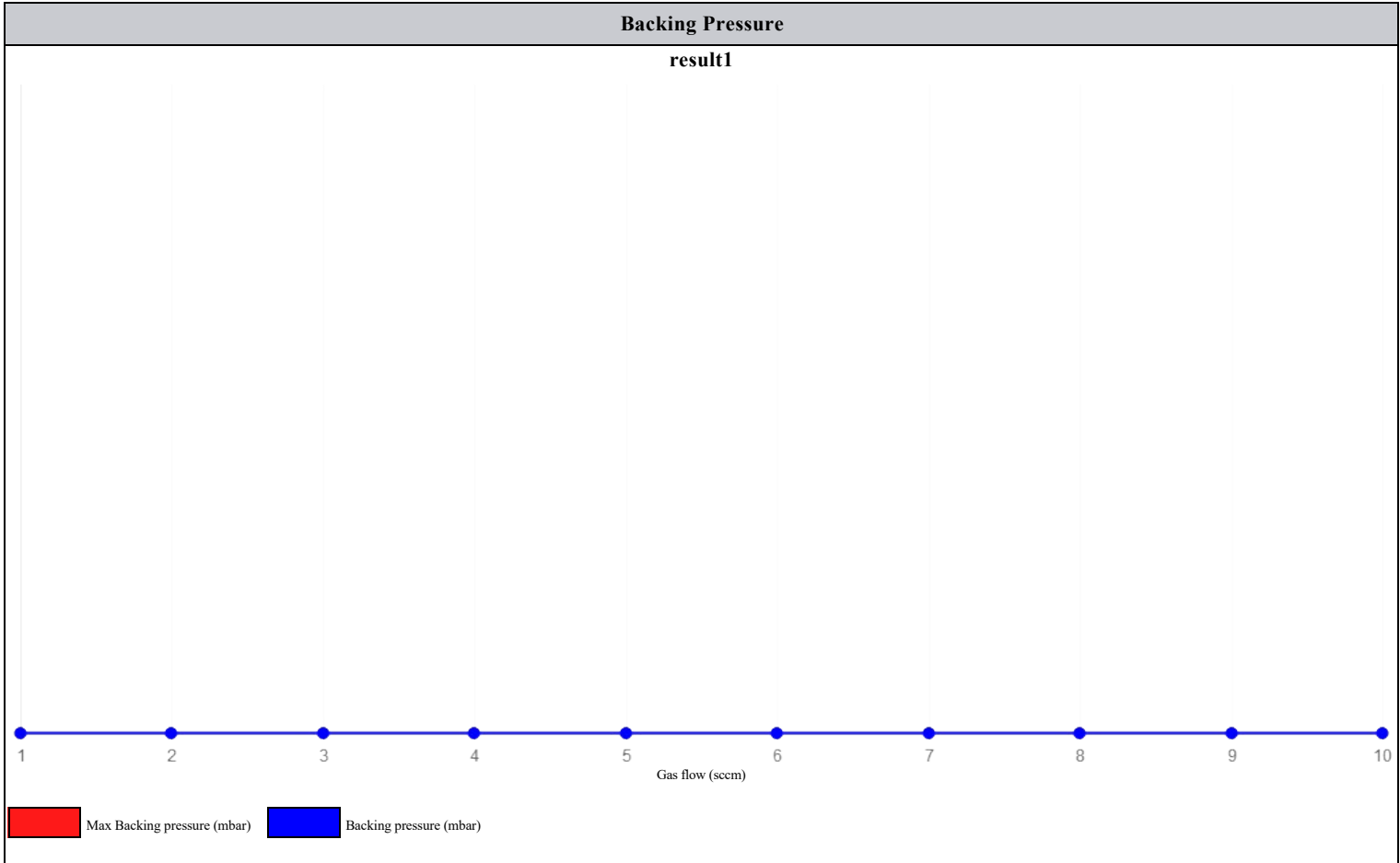
Pressure with gas	Low limit	High limit
1.27E+0	4.27E+0	4.28E+0

Notes

Notes gas flow
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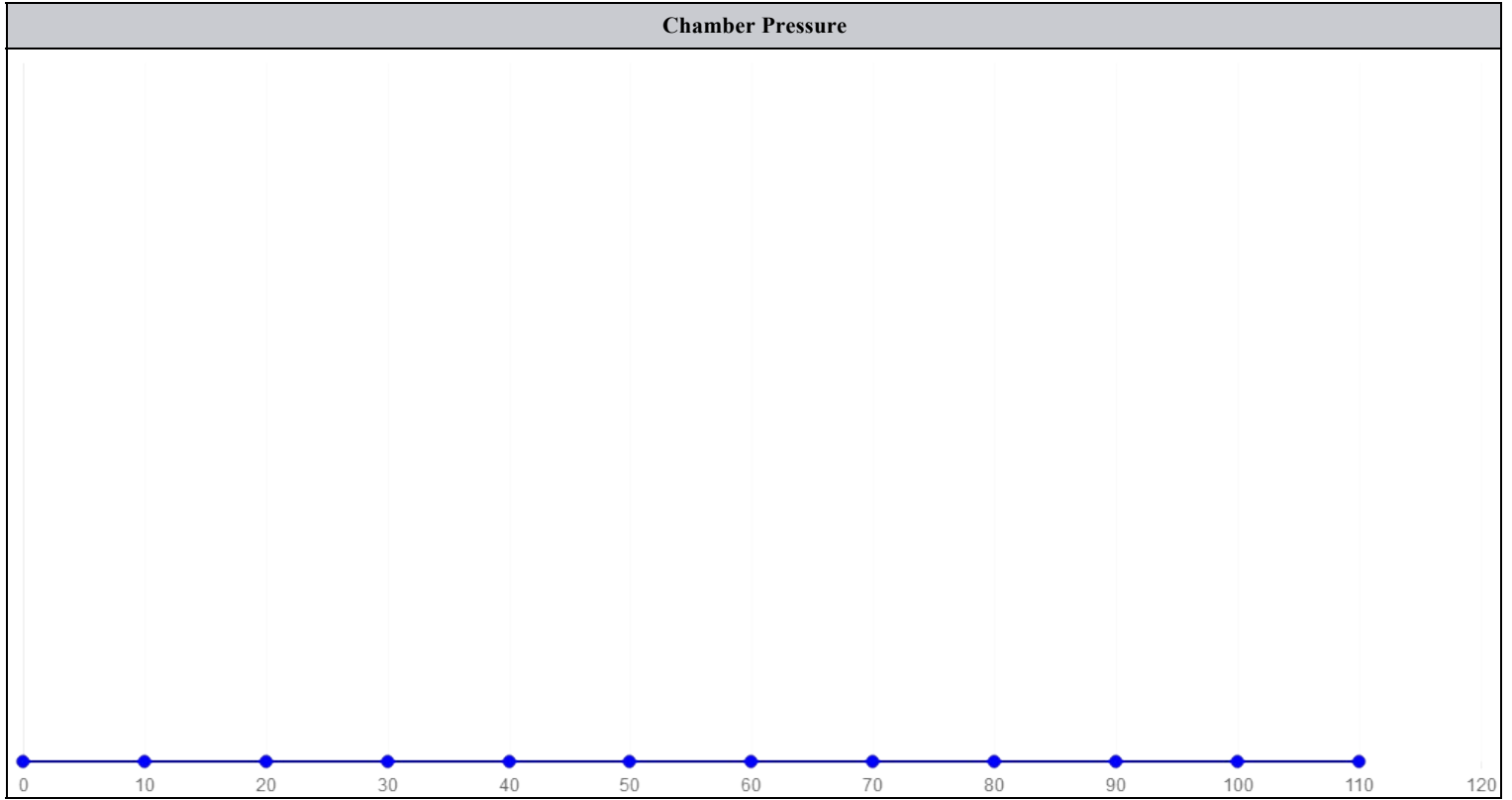
**Vacuum MFC curve test**

SCCM	Chamber pressure	Backing pressure
3	9.15E+0	1.11E+1



**Vacuum leak test**

Seconds since push standby	Chamber pressure	Max. Chamber pressure
80	4.00E+0	3.60E-06



**Diffusion pump & HVV timing**

TimeInto	HeatingTime	PumpingTimeBeforeOpenHVV	TimeToOpenHVV
Open HVV			29.0

**RP & DP pump oil condition**

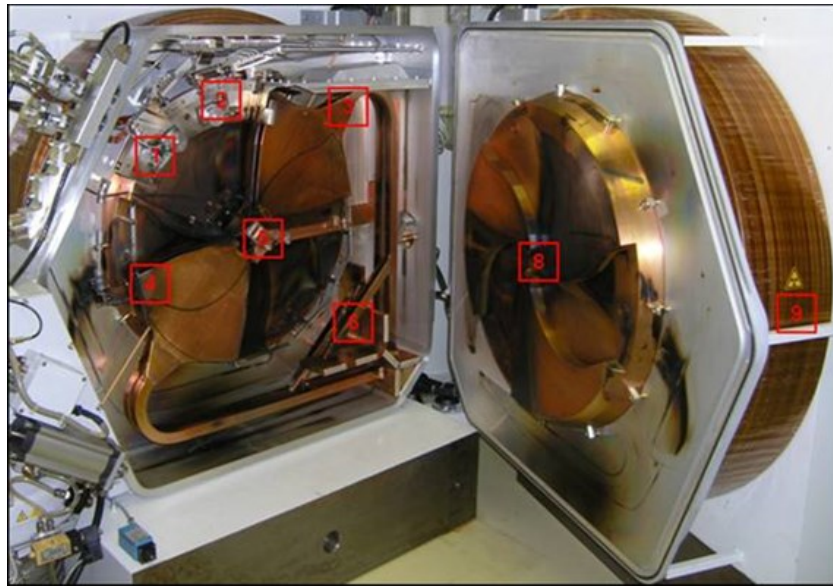
Date last rotary oil change: 2023-10-31

Roughing pump oil mist filter cleaned	Roughing pump oil is in good color and condition
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Last DP maintenance: 2023-10-31

DP oil is in good color and condition	
	<input checked="" type="checkbox"/>

RP Photo



**DP Photos**

[Photo DP](#)

Notes

oil change date

**OtherTest**

<b>Name the test</b>	Test number 1
<b>Test explanation</b>	this is the first test

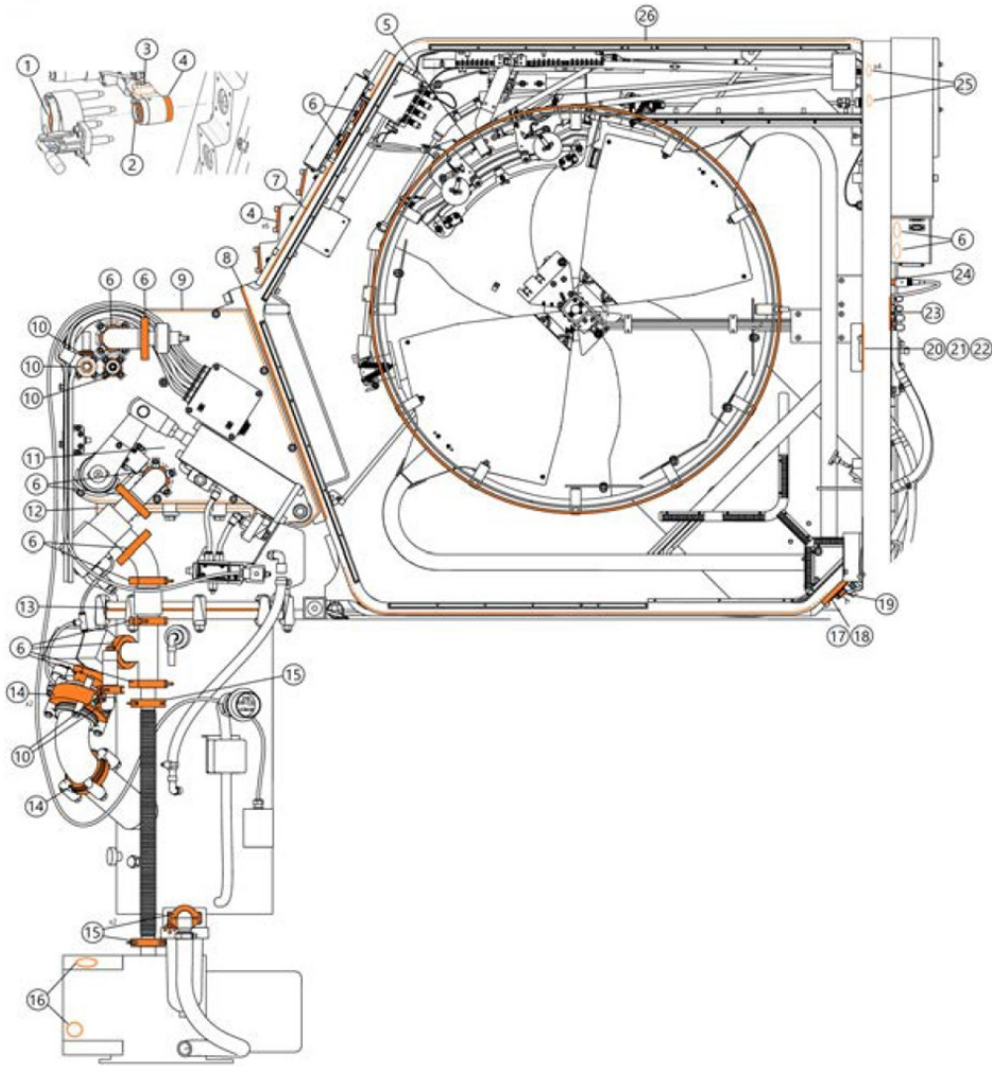
**Photos or Videos**

[Photo place](#)



**PETtrace800 O-Rings analysis**

**Pins**



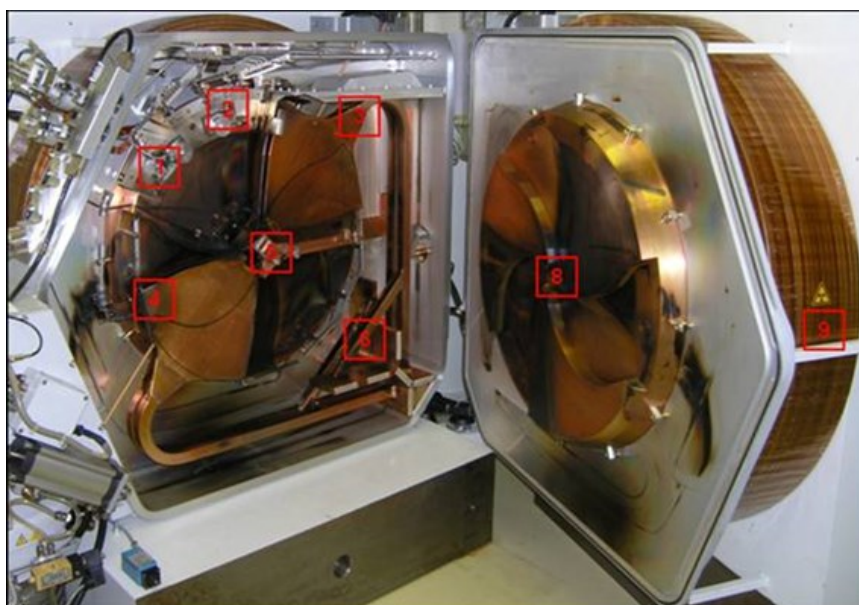
## CHAMBER

### Chamber Opening

Close target cooling water lines	✓
Bolt replacement if needed	✓
Initial opening of magnet door	✓
close again	✓

Measure yoke play, adjust if needed: 1.0

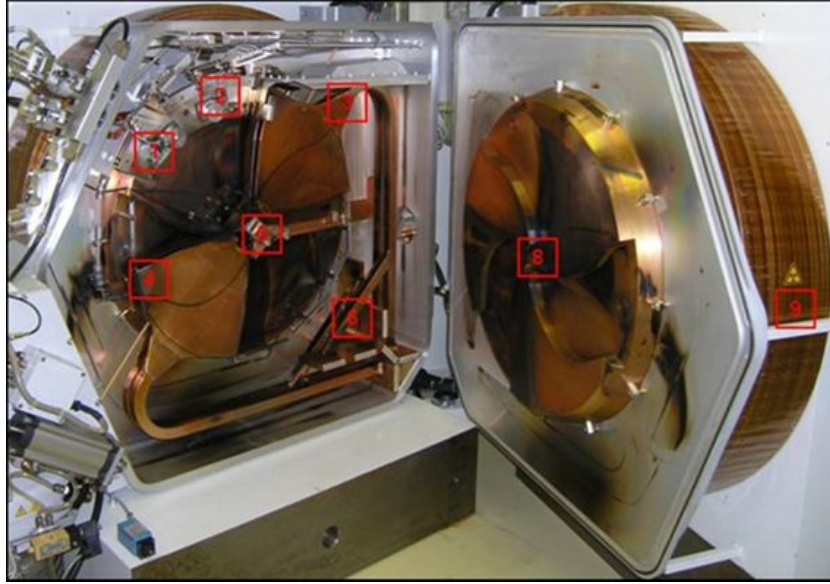
### Dose rate mapping (positions 1-9, [ $\mu\text{Sv/h}$ ])



Position 1: At 36 cm from Extraction trolley	123
Position 2: At 36 cm from Carousel	
Position 3: At 36 cm from Dee 2-stem junction	
Position 4: At 36 cm from Deel upper corner	
Position 5: At 36 cm from Central region	
Position 6: At 36 cm from Stems coupler	
Position 7: At contact with central region	
Position 8: At 36 cm from magnet pole	
Position 9: At contact of magnet coil	

## Photo documentation &amp; visual inspection

## Vacuum chamber

**Beam exit valve tests**

BEV replacement if needed	<input checked="" type="checkbox"/>
Tubing replacement if needed	<input checked="" type="checkbox"/>
Visual inspection of tubing	<input checked="" type="checkbox"/>

**Flaps****Flap 1**

Calibrate flaps, record minimum and maximum motor current:

<b>Minimum current [mA]</b>	
<b>MaximumCurrentMA</b>	

Record flap to dee distances for 0%, 50%, 100%

<b>0% value [mm]</b>	
<b>50% value [mm]</b>	
<b>100% value [mm]</b>	

**Flap 2**

Calibrate flaps, record minimum and maximum motor current:

<b>Minimum current [mA]</b>	45
<b>MaximumCurrentMA</b>	46

Record flap to dee distances for 0%, 50%, 100%

<b>0% value [mm]</b>	20.0
<b>50% value [mm]</b>	29.0
<b>100% value [mm]</b>	29.0

**Central Region**

<b>Visual inspection of flip-in probe</b>	<input checked="" type="checkbox"/>
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Measure flip-in probe position (a,b,c,d,e)

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
1.0	2.0	3.0	4.0	5.0

<b>Dismount ion source and mount dummy ion source</b>	<input checked="" type="checkbox"/>
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Measure central region distances (A, B, C, D) [mm]

A [mm]	B [mm]	C [mm]	D [mm]
15.0	30.0	45.0	60.0

<b>Visual inspection and photo of H-puller</b>	<input checked="" type="checkbox"/>
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<b>If needed: H-puller replacement</b>	<input checked="" type="checkbox"/>
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If needed: Adjustment of central region and record A, B, C, D again

<b>If needed: Adjustment of central region and record A, B, C, D again</b>	<input checked="" type="checkbox"/>
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A [mm]	B [mm]	C [mm]	D [mm]
10.0	20.0	30.0	40.0

<b>If needed: Ion source maintenance or replacement</b>	<input checked="" type="checkbox"/>
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<b>Install back ion source</b>	
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Restore and record flip-in probe position

<b>Restore and record flip-in probe position</b>	<input checked="" type="checkbox"/>
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A [mm]	B [mm]	C [mm]	D [mm]
90.0	100.0	110.0	120.0

Pictures	
Image	Comments
<a href="#">CentralRegion_9.jpg</a>	picture 1

**Dees**

Visual inspection of dees, internal and external baffles	<input checked="" type="checkbox"/>
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	Measure dee thickness	Measure dee height
A	1.0	9.0
B	2.0	10.0
C	3.0	11.0
D	4.0	12.0
E	5.0	13.0
F	6.0	14.0
G	7.0	15.0
H	8.0	16.0

Pictures	
Image	Comments
<a href="#">Dees_9.jpg</a>	2

Verify tightness of dee- and stem screws	<input checked="" type="checkbox"/>
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**Extraction**

Visual inspection of extraction cables	<input checked="" type="checkbox"/>
Test each microswitch of extraction system	<input checked="" type="checkbox"/>

Calibrate balance, record minimum and maximum motor current [mA]

	Calibrate balance, record minimum and maximum motor current	Calibrate extraction 1, record minimum and maximum motor current [mA]	Calibrate extraction 2, record minimum and maximum motor current [mA]
Minimum current [mA]	12.0	14.0	17.0
Maximum current [mA]	13.0	16.0	18.0

**Diagnostic system checks**

Target ID	
Visual inspection of collimators and collimator cables	<input checked="" type="checkbox"/>
Check collimator screws tightness	<input checked="" type="checkbox"/>
Measure flip-in probe resistance	<b>5.0</b>
Target Resistance	
Lower Collimator Resistance	
Upper Collimator Resistance	
Horizontal Collimator Opening	
VerticalCollimatorOpening	

	Resistance Measurement	Insulation Measurement
Extraction 1	7.0	9.0
Extraction 2	11.0	13.0

Comments	asdawd
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**Chamber Clean-up**

Carousel repositioning

<b>Foil change test on each carousel</b>	<input checked="" type="checkbox"/>
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<b>Full picture of vacuum chamber</b>
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[Image\\_17.jpg](#)

Chamber clean-up

<b>Check for left items</b>	<input checked="" type="checkbox"/>
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<b>Inspect RF finger contacts</b>	<input checked="" type="checkbox"/>
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**Cabinets**


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**Swedwater**

<b>Inspect cooling water system for leaks</b>	Magnet coil water connections, Water connections to vacuum chamber
<b>If needed inspection of cooling water filters</b>	Inspect Z2 filter, replace if needed

Record of water cooling system performance

<b>Record expansion vessel pressure BP1 [bar]</b>	1.0
<b>Record water level [mm]. Adjust if needed</b>	2.0
<b>Record main pump pressure BP2 [bar]</b>	3.0
<b>Record system temperature BT1 [°C]</b>	4.0
<b>Record temperature alarm setting [°C]</b>	5.0
<b>Record cooling water out temperature T2 [°C]</b>	6.0
<b>Record cooling water in temperature BT3 [°C]</b>	7.0
<b>Record deionizer flow BF10 [l/min]</b>	8.0
<b>Record conductivity BQ1[<math>\mu</math>S/cm]</b>	9.0
<b>Replace deionizer vessel if needed</b>	<input checked="" type="checkbox"/>

Pictures	
Image	Comments
<a href="#">Image_5.jpg</a>	picture swedewater

**Cabinets RFPG**

RFPG general tasks

Switch off power to RFPG, log out & tag out	Replace the RFPG air inlet filters, clean the front grid cover, inspect the grid of the back of the cabinet, clean if required
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

TAU inspection

TAU inspection	Verify that the grounding device is operational (completely in contact with the RF tube), Verify that no burn marks, loose cables, or water leaks are present
Repair and/or replace as required	4596

Take photos (upper and lower compartment)

<a href="#">Image_10.jpg</a>
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GSPU inspection

<b>Verify that no burn marks or loose cables are present</b>	<input checked="" type="checkbox"/>
<b>Clean</b>	<input checked="" type="checkbox"/>

Repair and/or replace as required
replace

Take photos

<a href="#">Image_10.jpg</a>
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DPA inspection

<b>Verify that no burn marks, loose cables, or water leaks are present</b>	<input checked="" type="checkbox"/>
<b>Clean</b>	<input checked="" type="checkbox"/>

Repair and/or replace as required
repair

Take photos

<a href="#">Image_10.jpg</a>
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TPSU back side inspection

<b>Record the resistance of the earth stick</b>	2123.0
<b>TPSU back side inspection</b>	Verify that no burn marks, loose cables, or water leaks are present

<b>Repair and/or replace as required</b>
repair and replace

Take photos

[Image\\_10.jpg](#)

<b>Remove earth stick</b>	<input checked="" type="checkbox"/>
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TPSU front side inspection

<b>TPSU front side inspection</b>	Check and tighten all terminal screws
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<b>Repair and/or replace as required</b>
replace

Take photos

[Image\\_10.jpg](#)

RFPG live tests

<b>Record RFPG water cooling pressure</b>	<b>Switch on RFPG main power</b>	<b>Record DPSU voltage [V]</b>	<b>Record DPSU ripple [mV rms]</b>
48.0	<input checked="" type="checkbox"/>	123.0	123.0

Record voltages on phase load detector board (SCU)

3V [V]	TP1 +15V [V]	TP2 -15V [V]	TP3 +5V [V]	TP4 +24V [V]
1.0	2.0	3.0	4.0	5.0

Record ripple on phase load detector board (SCU)

3V [V rms]	TP1 +15V [V rms]	TP2 -15V [V rms]	TP3 +5V [V rms]	TP4 +24V [V rms]
6.0	7.0	8.0	9.0	10.0

Turn on Magnet to set value



Record RF parameters in off mode

RFrom SCU Webpage:

DEE voltage ref [V]	11.0
DEE voltage read 1 [V]	12.0
DEE voltage read 2 [V]	13.0
RF fwd voltage [Vrms]	14.0
RF reflected voltage [Vrms]	15.0
DPA RF FWD voltage [Vrms]	16.0
FWD power [kW]	17.0
Reflected power [kW]	18.0
Anode voltage [kV]	19.0
Anode current [A]	70.0
Grid voltage [V]	21.0
Grid current [A]	22.0
Screen voltage [V]	23.0
Screen current [mA]	24.0
Heater voltage [V rms]	25.0

From PSS:

DEE voltage set [kV]	26.0
DEE voltage read [kV]	27.0
Delta DEE voltage set [kv]	28.0
Delta DEE voltage read [kV]	29.0
FWD power [kV]	30.0
Reflected power [kV]	31.0
Flap I start [%]	32.0
Flap I position [%]	33.0
Flap II start [%]	34.0
Flap II position [%]	35.0

Record RF parameters in standby mode

From SCU Webpage:

<b>DEE voltage ref [V]</b>	36.0
<b>DEE voltage read 1 [V]</b>	37.0
<b>DEE voltage read 2 [V]</b>	38.0
<b>DRF fwd voltage [Vrms]</b>	39.0
<b>RF reflected voltage [Vrms]</b>	40.0
<b>DPA RF FWD voltage [Vrms]</b>	41.0
<b>FWD power [kW]</b>	42.0
<b>Reflected power [kW]</b>	43.0
<b>Anode voltage [kV]</b>	44.0
<b>Anode current [A]</b>	45.0
<b>Grid voltage [V]</b>	46.0
<b>Grid current [A]</b>	47.0
<b>Screen voltage [V]</b>	48.0
<b>Screen current [mA]</b>	49.0
<b>Heater voltage [V rms]</b>	50.0

From PSS:

<b>DEE voltage set [kV]</b>	51.0
<b>DEE voltage read [kV]</b>	52.0
<b>Delta DEE voltage set [kv]</b>	53.0
<b>Delta DEE voltage read [kV]</b>	54.0
<b>FWD power [kV]</b>	55.0
<b>Reflected power [kV]</b>	56.0
<b>Flap I start [%]</b>	57.0
<b>Flap I position [%]</b>	58.0
<b>Flap II start [%]</b>	59.0
<b>Flap II position [%]</b>	60.0
<b>Soft-start RFPG. Start from 25kV / 0kV, ramp up with 1kV / 10s to config value</b>	<input checked="" type="checkbox"/>

Record RF parameters in on mode

From SCU Webpage:

DEE voltage ref [V]	61.0
DEE voltage read 1 [V]	62.0
DEE voltage read 2 [V]	63.0
RF fwd voltage [Vrms]	64.0
RF reflected voltage [Vrms]	65.0
DPA RF FWD voltage [Vrms]	66.0
FWD power [kW]	67.0
Reflected power [kW]	68.0
Anode voltage [kV]	69.0
Anode current [A]	70.0
Grid voltage [V]	71.0
Grid current [A]	72.0
Screen voltage [V]	73.0
Screen current [mA]	74.0
Heater voltage [V rms]	75.0

From PSS:

DEE voltage set [kV]	76.0
DEE voltage read [kV]	77.0
Delta DEE voltage set [kv]	78.0
Delta DEE voltage read [kV]	79.0
FWD power [kV]	80.0
Reflected power [kV]	81.0
Flap I start [%]	82.0
Flap I position [%]	83.0
Flap II start [%]	84.0
Flap II position [%]	85.0
Let the system run for approximately 1-2 hours, monitor parameters, record fastlog, five second log and statistic log, download the SCU logs.	86
Upload files	<a href="#">File_10.pdf</a>

Record RF parameters in on mode again

From SCU Webpage:

<b>DEE voltage ref [V]</b>	87.0
<b>DEE voltage read 1 [V]</b>	88.0
<b>DEE voltage read 2 [V]</b>	89.0
<b>RF fwd voltage [Vrms]</b>	90.0
<b>RF reflected voltage [Vrms]</b>	91.0
<b>DPA RF FWD voltage [Vrms]</b>	92.0
<b>FWD power [kW]</b>	93.0
<b>Reflected power [kW]</b>	94.0
<b>Anode voltage [kV]</b>	95.0
<b>Anode current [A]</b>	96.0
<b>Grid voltage [V]</b>	97.0
<b>Grid current [A]</b>	98.0
<b>Screen voltage [V]</b>	99.0
<b>Screen current [mA]</b>	100.0
<b>Heater voltage [V rms]</b>	101.0

From PSS:

<b>DEE voltage set [kV]</b>	102.0
<b>DEE voltage read [kV]</b>	103.0
<b>Delta DEE voltage set [kv]</b>	104.0
<b>Delta DEE voltage read [kV]</b>	105.0
<b>FWD power [kV]</b>	106.0
<b>Reflected power [kV]</b>	107.0
<b>Flap I start [%]</b>	108.0
<b>Flap I position [%]</b>	109.0
<b>Flap II start [%]</b>	110.0
<b>Flap II position [%]</b>	111.0
<b>Turn RFPG off</b>	<input checked="" type="checkbox"/>

**Cabinets PSMC****PSMC**

Inspect for water leaks, burn marks and broken parts, Open PSMC back door and side covers, Check and tighten all terminal screws

Verify the resistance values with the installation tester

Resistance between negative and positive [ $\Omega$ ]	Resistance between negative and ground [ $M\Omega$ ]	Resistance between positive and ground [ $M\Omega$ ]
30.0	2.0	9.0

**Real time measurements**

Turn on PSMC main power, Verify fan functionality, Verify interlock functionality, Install multimeter probes on positive and negative, guide them through the air outlet grid, connect oscilloscope

Record on sequence ramping speed	Record on sequence ramping up time to maximum	Record on sequence ramping up time to configuration value
4.0	65.0	87.0

Verify PSMC performance for H-config value

Set current	1.0
Output current [A]	2.0
Voltage read PSS [V]	3.0
Coil voltage [V]	4.0
Firing sequence [number of peaks in 20ms]	5.0
Ripple [mV rms]	6.0

Verify PSMC performance for 499A

Set current	7.0
Output current [A]	8.0
Voltage read PSS [V]	9.0
Coil voltage [V]	10.0
Firing sequence [number of peaks in 20ms]	11.0
Ripple [mV rms]	12.0

Verify PSMC performance for 250A

Set current	13.0
Output current [A]	14.0
Voltage read PSS [V]	15.0
Coil voltage [V]	16.0
Firing sequence [number of peaks in 20ms]	17.0
Ripple [mV rms]	18.0



Verify PSMC performance for 50A

Set current	19.0
Output current [A]	20.0
Voltage read PSS [V]	21.0
Coil voltage [V]	22.0
Firing sequence [number of peaks in 20ms]	23.0
Ripple [mV rms]	24.0

Turn off PSMC and measure off sequence ramping down time	<input checked="" type="checkbox"/>
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### Cabinets ACU

Record ACU voltages GND_IO / 24	Record ACU voltages GND_IO / +15V	Record ACU voltages GND_IO / -15V	Record ACU voltages GND / +5V	Record ACU voltages Chassis / GND_IO
15.0	20.0	45.0	62.0	73.0

### Cabinets PDU

Visual inspection	<input checked="" type="checkbox"/>
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Pictures	
Image	Comments
<a href="#">Image_6.jpg</a>	PDU photo

Check and tighten all terminal screws	<input checked="" type="checkbox"/>
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**Ion Source**


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**Record H2 gas pressure**

Set point [bar]	Reading at MFC [bar]
8.0	6.0

**Turn on Magnet, set probe in, turn on RF, turn on gas.**

Magnet current [A]	DEE1 voltage [kV]	DEE2 voltage [kV]	Gas flow [sccm]	If ion source was maintained, perform ion source conditioning (ramp up from 30 mA to 100 mA in 30 minutes and from 100mA to 200mA in 10 minutes)
4.0	5.0	6.0	9.0	<input checked="" type="checkbox"/>

**Record Ion Source Performance**

IS current [mA]	IS voltage [V]	Flip in probe current [ $\mu$ A]
32.0	33.0	34.0

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**Paper Burn Test**

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<b>Install paper burn target</b>	<input checked="" type="checkbox"/>
<b>Perform paper burn test in SB and DB</b>	<input checked="" type="checkbox"/>



<b>Install paper burn target</b>
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<a href="#">Image_7.jpg</a>
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<b>If needed, adjust collimators and repeat</b>	collimators adjusted
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## LTF

<b>Identifier</b>	LTF1
<b>LTF</b>	Replace target water-18 peek line and connectors,Install back targets
<b>Inspect the movement of all LTF compressed air actuators</b>	V2,V3,V4,Syringe

<b>Starting pressure [psi]</b>	<b>Pressure drop [psi / h]</b>
4.0	5.0

<b>If needed: Perform target fill tests and adjustment for each target</b>	6.0
<b>If needed, adjust and repeat test, record adjustment value</b>	7.0

<b>Pictures</b>	
<b>Image</b>	<b>Comments</b>
<a href="#">Image_6.jpg</a>	photo 1

### Autoshield

Check compressor oil level and operational hours	45.0
<b>Autoshield</b>	Manually drain the the air tank and the air manifold to evacuate condensated water,Verify the air tank relief valve operation, repair/replace as required
Verify tank water level and float switches functionality, top up water level/repair and/or replace switches as required	<input checked="" type="checkbox"/>
Verify functionallity of micro switches for: Door closed	<input checked="" type="checkbox"/>
Read and record door lift timing for left door	6.0
Read and record door lift timing for right door	4.0
Verify functionallity of skirt microswitches and that the skirts seats properly on the micro switches	<input checked="" type="checkbox"/>
Verify tightening of the upper and the lower socket heads screws	<input checked="" type="checkbox"/>
Check the hinges of left and right door	<input checked="" type="checkbox"/>

#### Autoshield Upper

##### Read and record upper manometer lifting pressures

K1	K2	K3	K4	K5	K6
1.0	2.0	3.0	4.0	5.0	6.0

#### Autoshield Lower

##### Read and record lower manometer lifting pressures

K1	K2	K3	K4	K5	K6
9.0	8.0	7.0	6.0	5.0	4.0

#### Pictures

Image	Comments
<a href="#">Image_8.jpg</a>	

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**Beam Conditioning**

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Photo name	Add Comment
<a href="#">Image_11.jpg</a>	

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**PMDebriefing**

<b>Record additional tasks performed not recorded elsewhere</b>	<b>Record open tasks and issues</b>	<b>Record spare parts / consumables to be ordered</b>	<b>Record worker dosimetry</b>
6	7	8	9.0