



**MAINTENANCE TRACKING TOOL**  
**PETTRACE800**

Date:2024-03-16

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

**PRE-MAINTENANCE**

Registration Date: 2024-03-16

Gas flow(sccm): 5.0

**TPG Settings Verifications**

	Low limit (x10-)	High limit (x10-)
<b>Piranni 1 (TPG300 A1):</b>	0.1	
<b>Piranni 2 (TPG300 A2):</b>	7.00E-2	0.2
<b>Penning:</b>	1.80E-5	2.50E-5

Notes

on tablet the keyboard only shows numbers and no letters available

Gauge number	Pressure (x10-) without gas	Pressure (x10-) with gas
<b>A1 (mbar):</b>	0.038	0.082
<b>A2 Under Range:</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>A2:</b>	-	-
<b>B1 (mbar):</b>	1.20E-7	1.30E-5

**System software**

Subsystem	Version
<b>Master:</b>	3.6.3
<b>ACS:</b>	4.3.2
<b>Service System:</b>	3.6.0
<b>Manager:</b>	N/A
<b>Informix (only applicable to SUN-Master Station):</b>	

Comments

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Paper Burn Before PM

<b>Photos</b>
There is not photographic evidence

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**VACUUM**


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**TPG settings verifications**

Date: 2024-03-16

Production gas flow: 5.0

Piranni 1 (TPG300 A1)

Pressure with gas	Low limit (x10-)	High limit
0.082	0.1	0.7

Piranni 2 (TPG300 A2)

Under range	Pressure with gas	Low limit	High limit
<input checked="" type="checkbox"/>	-	7.00E-2	0.2

Penning

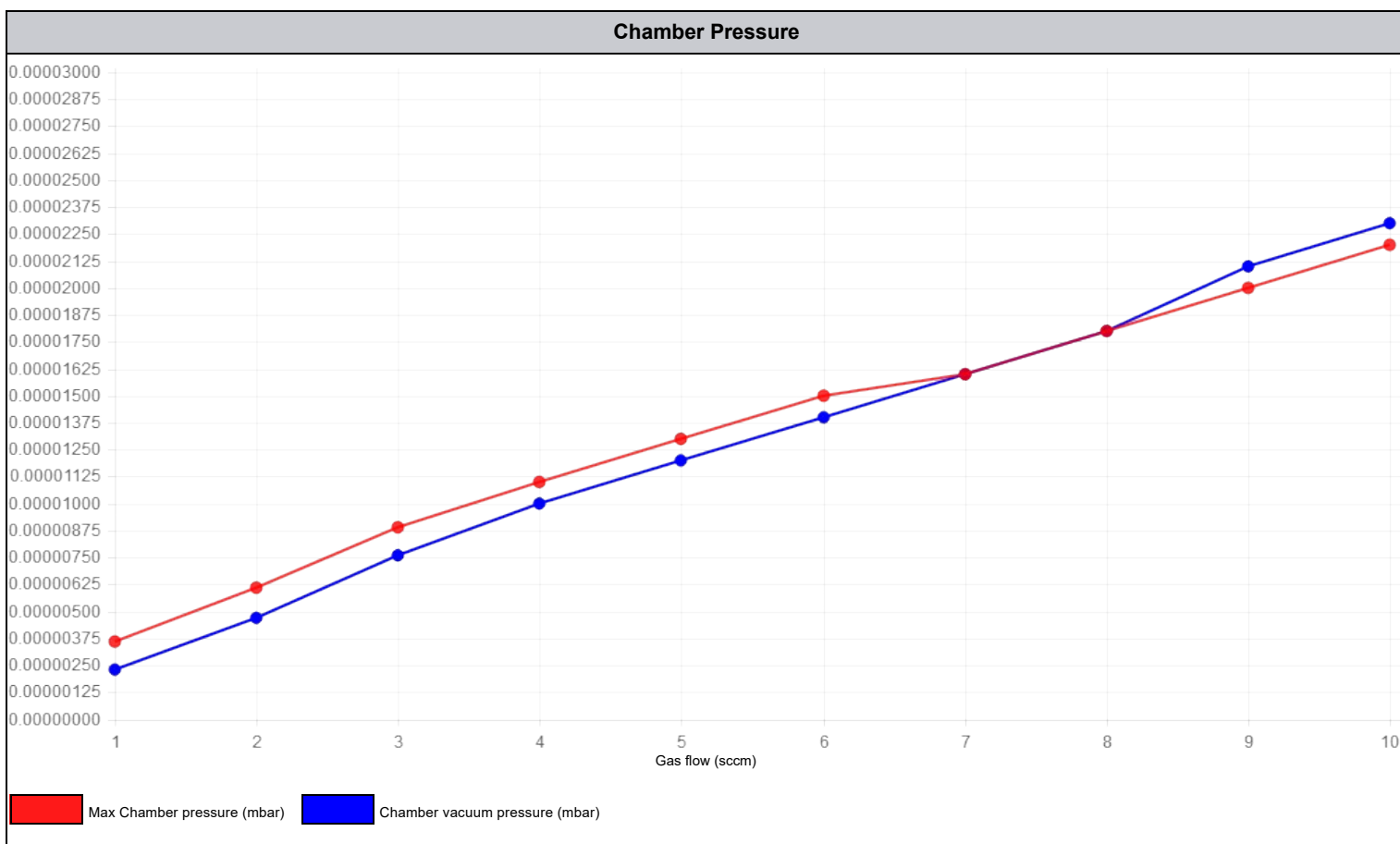
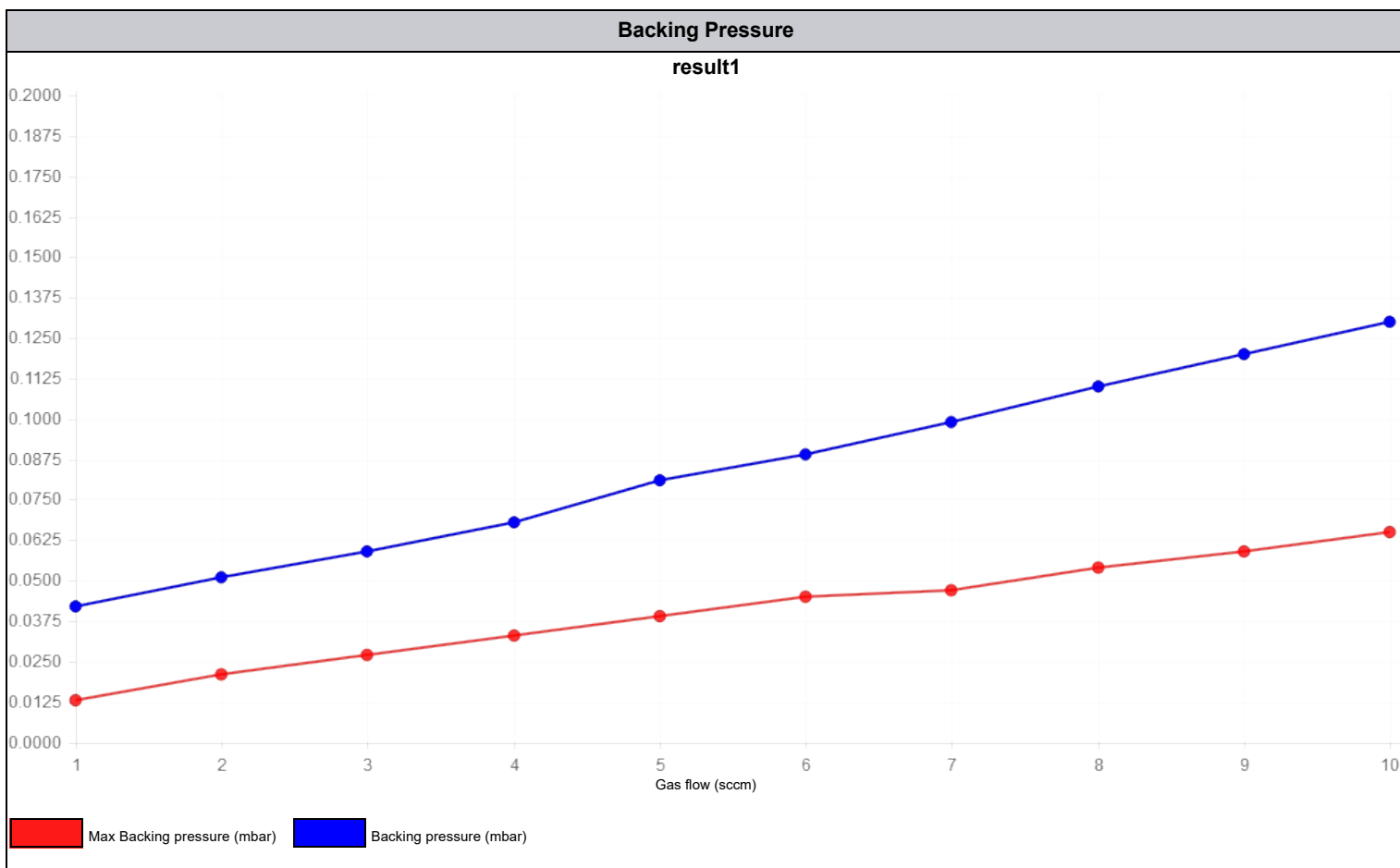
Pressure with gas	Low limit	High limit
1.30E-5	1.80E-5	2.50E-5

Notes

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**Vacuum MFC curve test**

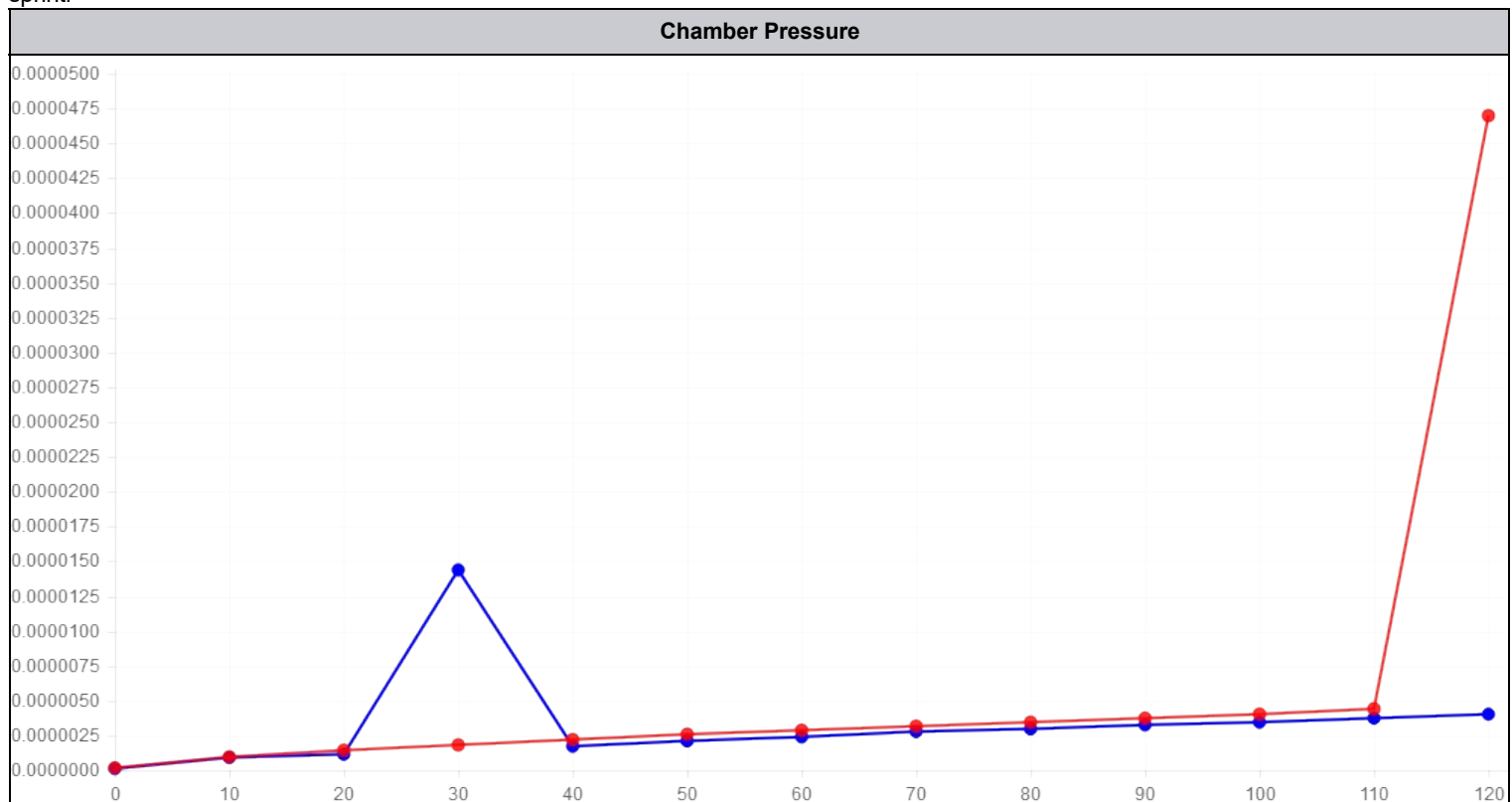
SCCM	Chamber pressure	Backing pressure
1	2.30E-6	0.042
2	4.70E-6	0.051
3	7.60E-6	0.059
4	1.00E-5	0.068
5	1.20E-5	0.081
6	1.40E-5	0.089
7	1.60E-5	0.099
8	1.80E-5	0.11
9	2.10E-5	0.12
10	2.30E-5	0.13



**Vacuum leak test**

Seconds since push standby	Chamber pressure	Max. Chamber pressure
0	1.30E-7	1.80E-07
10	9.60E-7	1.00E-06
20	1.20E-6	1.50E-06
30	1.50E-5	1.90E-06
40	1.80E-6	2.30E-06
50	2.20E-6	2.70E-06
60	2.50E-6	3.00E-06
70	2.90E-6	3.30E-06
80	3.10E-6	3.60E-06
90	3.40E-6	3.90E-06
100	3.60E-6	4.20E-06
110	3.90E-6	4.60E-06
120	4.20E-6	4.90E-06

sprintf



**Diffusion pump & HVV timing**

TimeInto	HeatingTime	PumpingTimeBeforeOpenHVV (Min)	TimeToOpenHVV
Heating oil	30.0		

TimeInto	HeatingTime	PumpingTimeBeforeOpenHVV (Min)	TimeToOpenHVV
Pump		12.0	

TimeInto	HeatingTime	PumpingTimeBeforeOpenHVV (Min)	TimeToOpenHVV
Open HVV			21.0

**RP & DP pump oil condition**

Date last rotary oil change: 2024-03-19

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: 2023-09-06

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

**RP Photo**



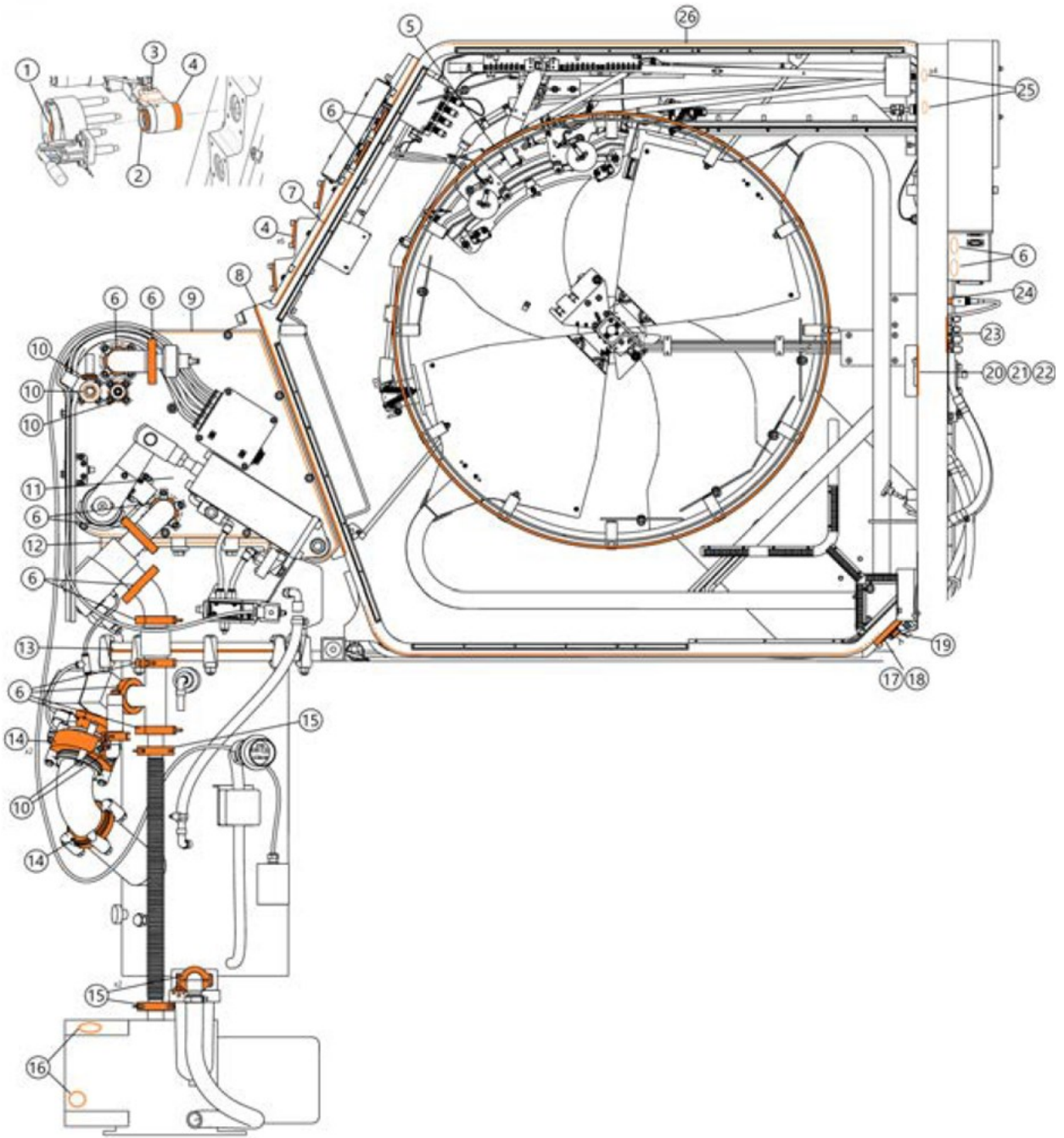
**DP Photos**

[Photo DP](#)

Notes

PETtrace800 O-Rings analysis

Pins





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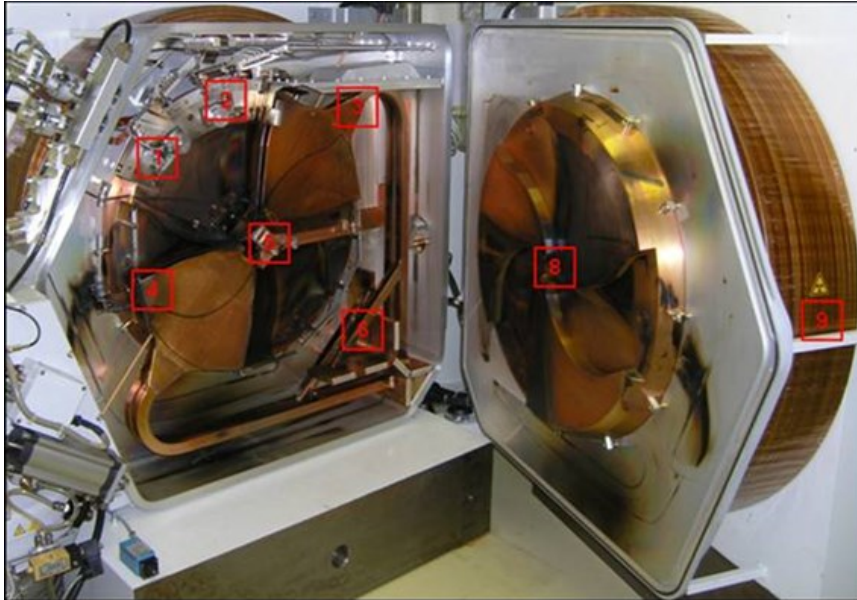
**CHAMBER**


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**Chamber Opening**

Visual inspection of door bolts and motor	✓
Close target cooling water lines	✓
Remove targets	✓
Initial opening of magnet door	✓
close again	✓
Bolt replacement if needed	✓

Measure yoke play, adjust if needed: 5.26

**Dose rate mapping (positions 1-9, [ $\mu$ Sv/h])**


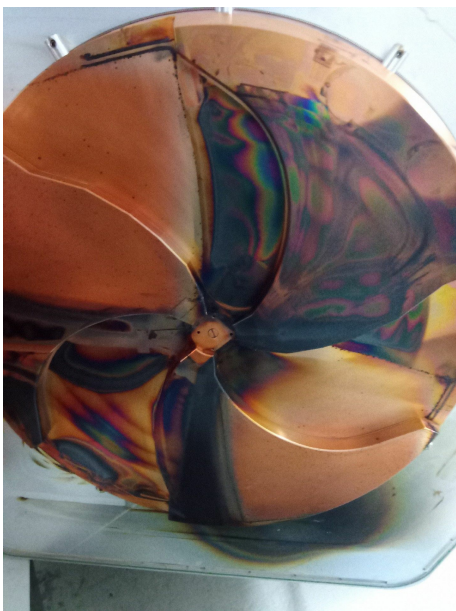
Position 1: At 36 cm from Extraction trolley	-
Position 2: At 36 cm from Carousel	-
Position 3: At 36 cm from Dee 2-stem junction	-
Position 4: At 36 cm from Deel upper corner	-
Position 5: At 36 cm from Central region	-
Position 6: At 36 cm from Stems coupler	-
Position 7: At contact with central region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

**Photo documentation & visual inspection**

**Vacuum chamber**



**Magnet pole**



**Photo documentation & visual inspection**

**Central region**

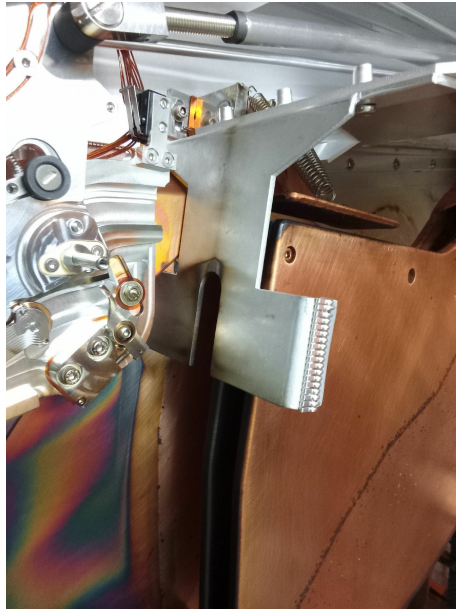


**Extraction**



**Photo documentation & visual inspection**

**Screen plate beam passage**

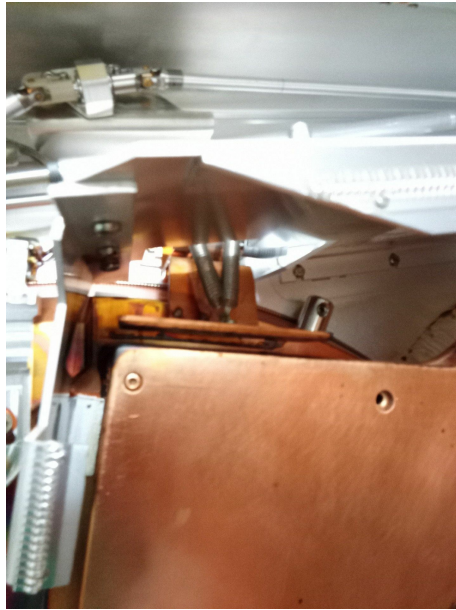


**Flap 1**



Photo documentation & visual inspection

Flap 2



Flap 2

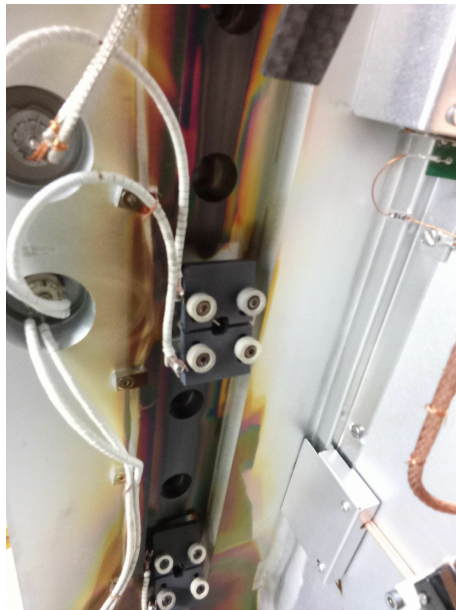


Photo documentation & visual inspection

Collimators



Collimators



## Photo documentation &amp; visual inspection

## Others

**Beam exit valve tests**

Visual inspection of opening/closing	<input checked="" type="checkbox"/>
Visual inspection of tubing	<input checked="" type="checkbox"/>
Target port O-ring replacement	<input checked="" type="checkbox"/>

**Flaps**Flap 1

Calibrate flaps, record minimum and maximum motor current:

<b>Minimum current [mA]</b>	21
<b>MaximumCurrentMA</b>	205

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

<b>0% value [mm]</b>	4.24
<b>50% value [mm]</b>	10.94
<b>100% value [mm]</b>	34.37

Notes

Flap 2

Calibrate flaps, record minimum and maximum motor current:

<b>Minimum current [mA]</b>	62
<b>MaximumCurrentMA</b>	108

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

<b>0% value [mm]</b>	5.49
<b>50% value [mm]</b>	13
<b>100% value [mm]</b>	33.47

Notes



**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]
52.39	47.32	47.81	81.39	2.25

<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]
0.8	1.15	0.5	0.8

<b>Visual inspection and photo of H-puller</b>	<input checked="" type="checkbox"/>
<b>If needed: H-puller replacement</b>	



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>			
A [mm]	B [mm]	C [mm]	D [mm]
-	-	-	-

<b>If needed: Ion source maintenance or replacement</b>	<input checked="" type="checkbox"/>
<b>Install back ion source</b>	<input checked="" type="checkbox"/>



Restore and record flip-in probe position

<b>Restore and record flip-in probe position</b>			
A [mm]	B [mm]	C [mm]	D [mm]
53.02	47.77	47.6	80.3

Pictures	
Image	Comments
<a href="#">CentralRegion_7.jpg</a>	
<a href="#">CentralRegion_8.jpg</a>	
<a href="#">CentralRegion_9.jpg</a>	
<a href="#">CentralRegion_10.jpg</a>	After mounting maintained IS

**Dees**

Visual inspection of dees, internal and external baffles	<input checked="" type="checkbox"/>
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	Measure dee thickness	Measure dee height
A	32.53	47.14
B	33.81	75.87
C	34.04	47.82
D	33.85	47.23
E	32.82	74.22
F	32.46	46.63
G	33.44	74.52
H	33.01	73.88

Pictures	
Image	Comments
Verify tightness of dee- and stem screws	<input checked="" type="checkbox"/>

**Extraction**

Visual inspection of extraction cables	<input checked="" type="checkbox"/>
Test each microswitch of extraction system	<input checked="" type="checkbox"/>
Replace extraction foils of carousels	<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]	69	68	63
Maximum current [mA]	114	112	96

**Diagnostic system checks**

Target ID	1
Visual inspection of collimators and collimator cables	<input checked="" type="checkbox"/>
Check collimator screws tightness	<input checked="" type="checkbox"/>
Measure flip-in probe resistance	29.47
Target Resistance	20.05
Lower Collimator Resistance	29.45
Upper Collimator Resistance	29.47
Horizontal Collimator Opening	10
VerticalCollimatorOpening	10.02

	Resistance Measurement	Insulation Measurement
Extraction 1	29.47	-
Extraction 2	29.5	-

Comments	Vertical opening adjusted from 10.6 to 10.0
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<b>Target ID</b>	4
<b>Visual inspection of collimators and collimator cables</b>	✓
<b>Check collimator screws tightness</b>	✓
<b>Measure flip-in probe resistance</b>	29.47
<b>Target Resistance</b>	20.07
<b>Lower Collimator Resistance</b>	29.48
<b>Upper Collimator Resistance</b>	29.47
<b>Horizontal Collimator Opening</b>	10
<b>VerticalCollimatorOpening</b>	10.04

	<b>Resistance Measurement</b>	<b>Insulation Measurement</b>
<b>Extraction 1</b>	29.47	-
<b>Extraction 2</b>	29.5	-

<b>Comments</b>	Opening adjusted from 10.4 to 10.0
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### Chamber Clean-up

Carousel repositioning

<b>Install back carousels</b>	✓
<b>Foil change test on each carousel</b>	✓
<b>Reset foil counter</b>	✓

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**Cabinets**


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**Swedewater**

<b>Inspect cooling water system for leaks</b>	Swedewater cabinet
<b>If needed inspection of cooling water filters</b>	Inspect and clean Z1 filter,Inspect Z2 filter, replace if needed,Inspect and clean Z3 filter

Record of water cooling system performance

<b>Record expansion vessel pressure BP1 [bar]</b>	0.43
<b>Record water level [mm]. Adjust if needed</b>	95
<b>Record main pump pressure BP2 [bar]</b>	7.9
<b>Record system temperature BT1 [°C]</b>	19.9
<b>Record temperature alarm setting [°C]</b>	27
<b>Record cooling water out temperature T2 [°C]</b>	12
<b>Record cooling water in temperature BT3 [°C]</b>	9.5
<b>Record deionizer flow BF10 [l/min]</b>	1.6
<b>Record conductivity BQ1[μS/cm]</b>	0.09
<b>Replace deionizer vessel if needed</b>	<input checked="" type="checkbox"/>

Pictures	
Image	Comments
<a href="#">Image_3.jpg</a>	
<a href="#">Image_4.jpg</a>	
<a href="#">Image_5.jpg</a>	Water level
<a href="#">Image_6.jpg</a>	Tubing colour
<a href="#">Image_7.jpg</a>	Values before swedewater maintenance

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**Ion Source**


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Record H2 gas pressure

Set point [SCCM]	Reading at MFC [bar]
2	2

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)
426.8	36	40	5	<input checked="" type="checkbox"/>

**Record Ion Source Performance**

IS current [mA]	IS voltage [V]	Flip in probe current [ $\mu$ A]
10	1088	1
13	1126	1.7
16	1157	2.7
19	1167	3.5
22	1189	4.8
25	1220	6.7
28	1252	8.9
31	1287	10.7
34	1309	13.2
37	1324	16.6
40	1333	20.1
43	1337	22.5
46	1341	26.9
49	1344	32.6
52	1349	38
55	1346	44.4
58	1341	51.6
61	1327	59.9
64	1312	66.1
67	1297	73.6
70	1278	81.1
73	1259	29
76	1243	95.2
79	1226	103.1
82	1205	112.1
85	1189	117.6
88	1170	125.3
91	1151	132.5
94	1132	139.5
97	1119	145.1



100	1100	152.5
110	1047	175.1
120	999	195.6
130	958	212.3
140	919	230.1
150	884	242.4
160	852	253.3
170	826	261.2
180	798	267.8
190	773	273.1
200	750	275.4

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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>
<a href="#">Image_8.jpg</a> <a href="#">Image_9.jpg</a>

<b>If needed, adjust collimators and repeat</b>	
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## LTF

<b>Identifier</b>	LTF1
<b>LTF</b>	
<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>
402.8	9.96

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

<b>Pictures</b>	
<b>Image</b>	<b>Comments</b>

<b>Identifier</b>	LTF4
<b>LTF</b>	
<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>
426.7	15.5

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

<b>Pictures</b>	
<b>Image</b>	<b>Comments</b>
<b>No photo taked</b>	V3, V4 replaced because of leaks

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**Beam Conditioning**

Photo name	Add Comment
<a href="#">Image_3.jpg</a>	No comments

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**PMDebriefing**


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Record additional tasks performed not recorded elsewhere	Record open tasks and issues	Record spare parts / consumables to be ordered	Record worker dosimetry	
			Name	Total Dose [uSv]
	-manometer return cyclotron cooling circuit -switch for pump control cold storage cyclotron (roof)	-peak hand tightening tool -50 mikron filter for sweedewater	Baker	142
			Attila	108
			Marc	60