



MAINTENANCE TRACKING TOOL

PETTRACE800

Date:2023-11-13

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

PRE-MAINTENANCE

Registration Date: 2023-11-1300

Gas flow(sccm): 4.0

TPG Settings Verifications

	Low limit (x10-)	High limit (x10-)
Piranni 1 (TPG300 A1):	1.00E-1	7.00E-1
Piranni 2 (TPG300 A2):	7.00E-2	2.00E-1
Penning:	1.80E-5	3.00E-5

Notes

notas1

Gauge number	Pressure (x10-) without gas	Pressure (x10-) with gas
A1 (mbar):	0,0036	0,035
A2 Under Range:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A2:		
B1 (mbar):	0,000000053	0,000012

System software

Subsystem	Version
Master:	3,6
ACS:	4.3.2
Service System:	3.6.0
Manager:	TSA
Informix (only applicable to SUN-Master Station):	NA

Comments

comment general 2

Paper Burn Before PM

photo1 pm

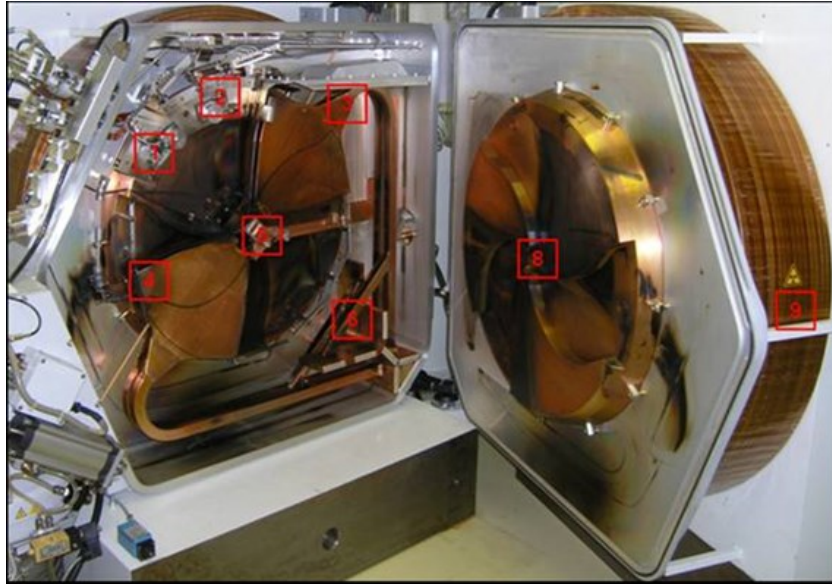


photo 2 pm



VACUUM

TPG settings verifications

Date: 2023-11-13

Production gas flow: 5.0

Piranni 1 (TPG300 A1)

Pressure with gas	Low limit (x10-)	High limit
1.30E-2	1.20E-3	1.70E-3

Piranni 2 (TPG300 A2)

Under range	Pressure with gas	Low limit	High limit
<input checked="" type="checkbox"/>	0.00E+0	1.80E-6	2.40E-6

Penning

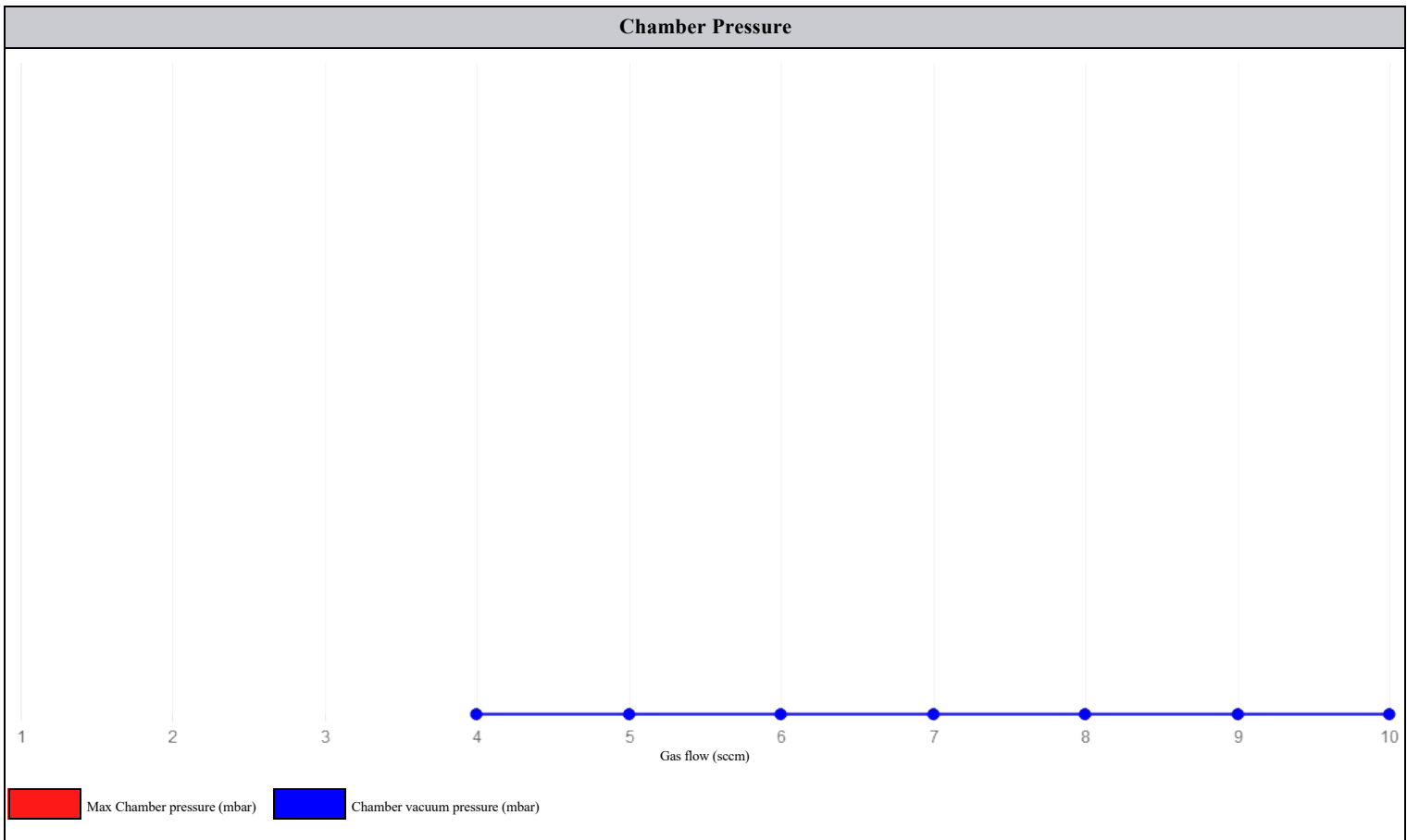
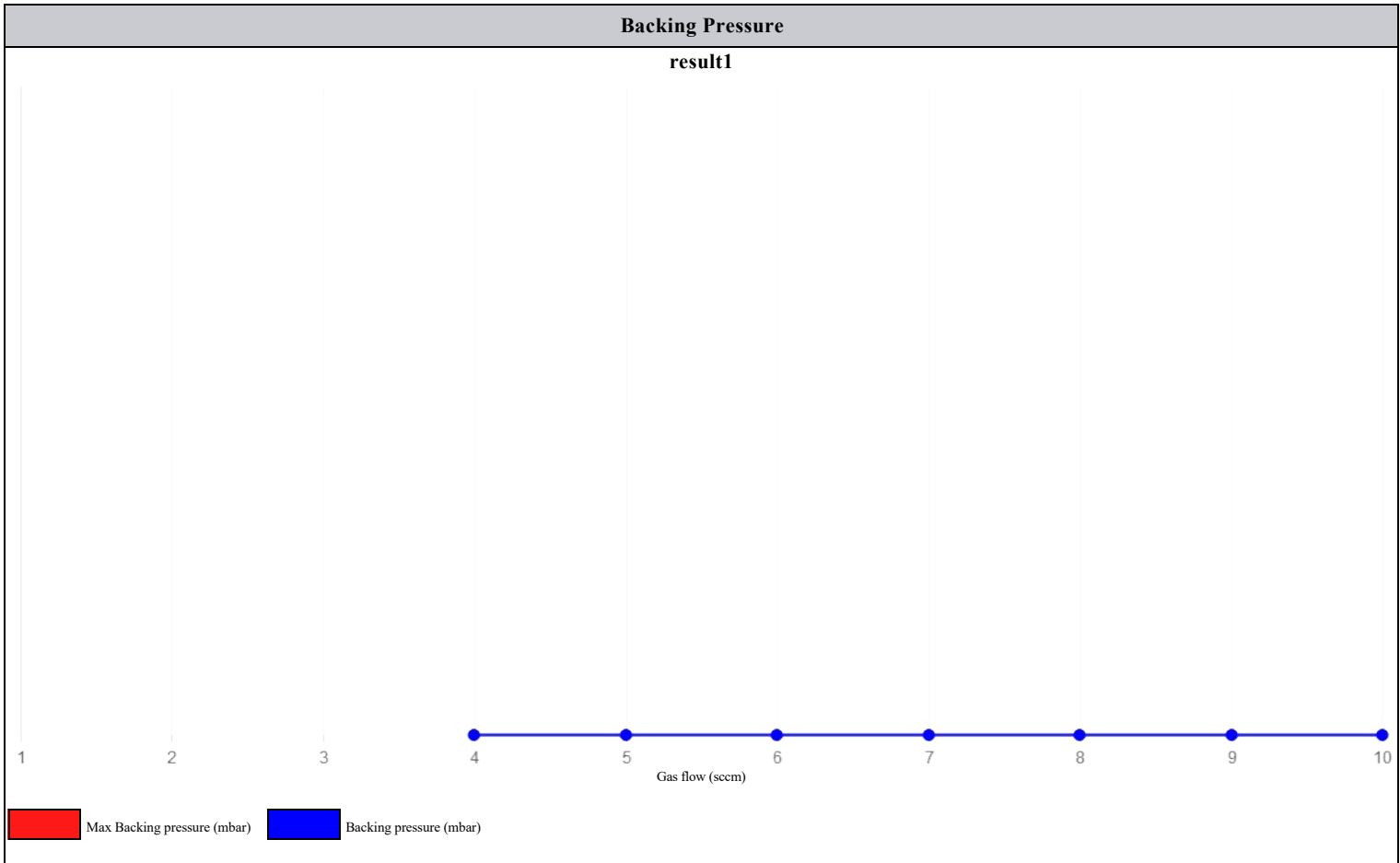
Pressure with gas	Low limit	High limit
2.50E-3	2.60E-3	3.00E-3

Notes

notes vacuum TPG settings

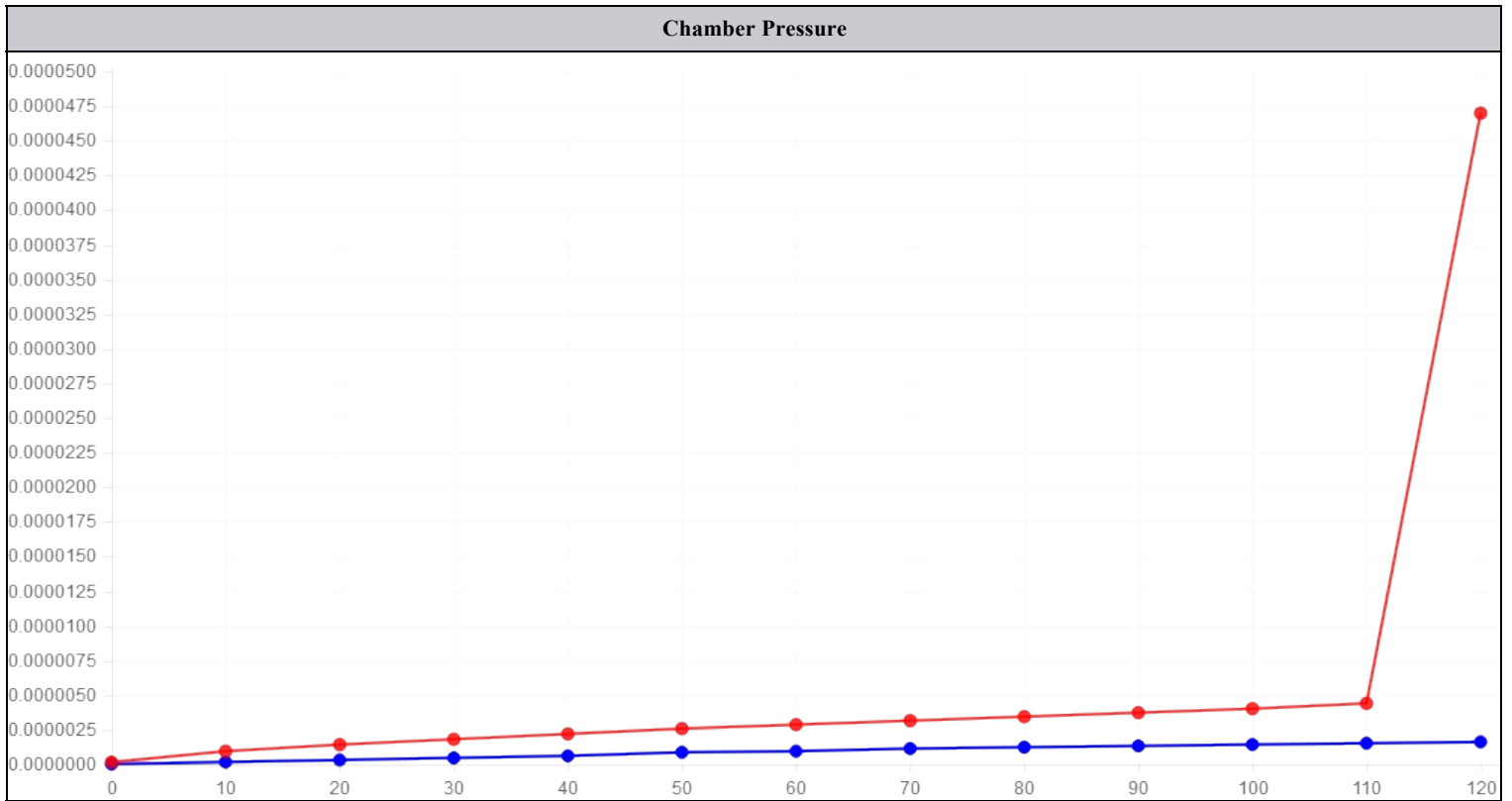
Vacuum MFC curve test

SCCM	Chamber pressure	Backing pressure
1	3.60E-6	1.30E-2
2	5.40E-6	2.10E-2
3	8.70E-6	2.70E-2



Vacuum leak test

Seconds since push standby	Chamber pressure	Max. Chamber pressure
0	3.00E-8	1.80E-07
10	1.90E-7	1.00E-06
20	3.40E-7	1.50E-06
30	5.00E-7	1.90E-06
40	6.50E-7	2.30E-06
50	9.20E-7	2.70E-06
60	1.00E-6	3.00E-06
70	1.20E-6	3.30E-06
80	1.30E-6	3.60E-06
90	1.40E-6	3.90E-06
100	1.50E-6	4.20E-06
110	1.60E-6	4.60E-06
120	1.70E-6	4.90E-06



Diffusion pump & HVV timing

TimeInto	HeatingTime	PumpingTimeBeforeOpenHVV	TimeToOpenHVV
Heating oil	45.0		

TimeInto	HeatingTime	PumpingTimeBeforeOpenHVV	TimeToOpenHVV
Pump		15.0	

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 Photos
There is not photographic evidence

Photos
There is not photographic evidence

Notes

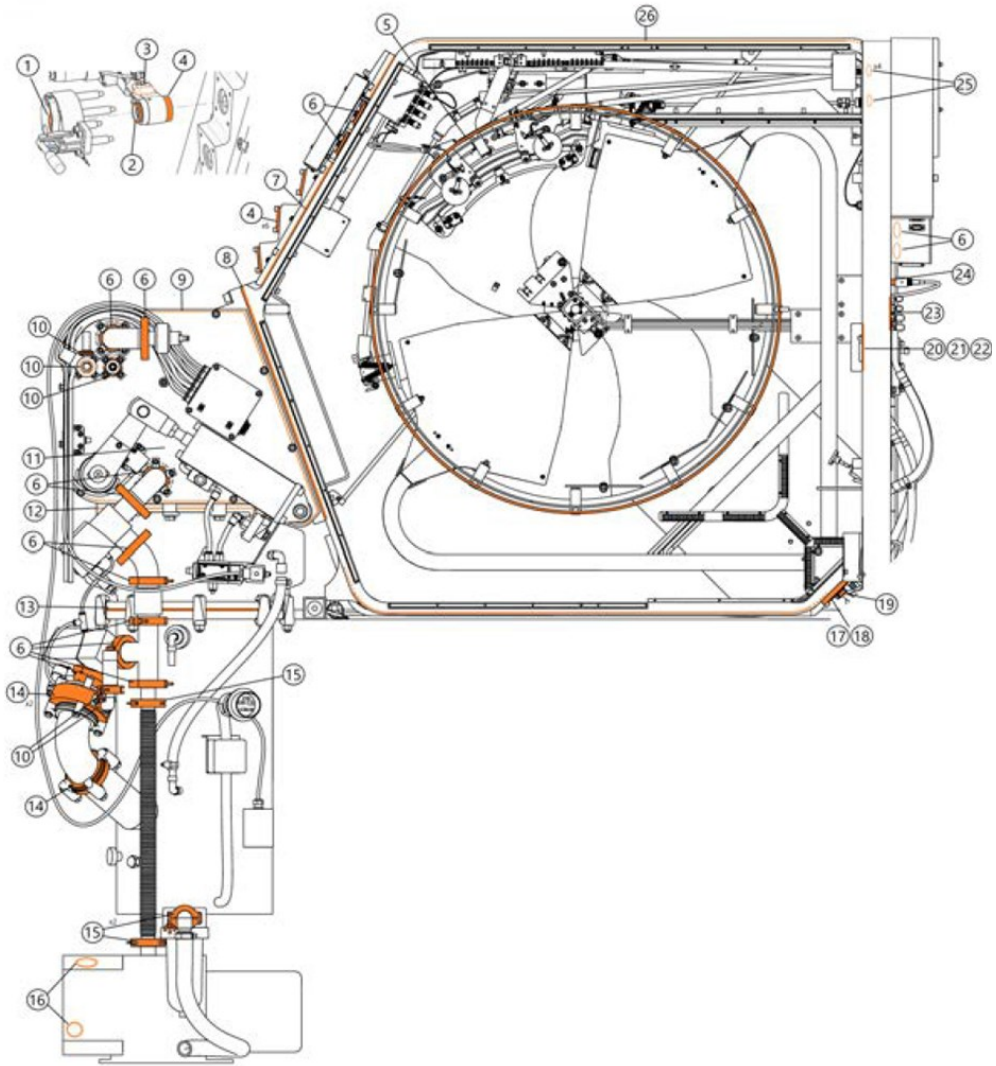
Comment RP y DP

OtherTest

Name the test	other test vacuum 1
Test explanation	Aliquam at vehicula nisi. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia curae; Proin ultricies vulputate sapien vel vestibulum. Suspendisse dictum metus lectus, vitae euismod arcu euismod id. Nulla ornare lectus a ex convallis cursus eget sit amet tellus. Fusce vulputate venenatis eleifend. Curabitur at libero sed ipsum condimentum sollicitudin.

PETtrace800 O-Rings analysis

Pins



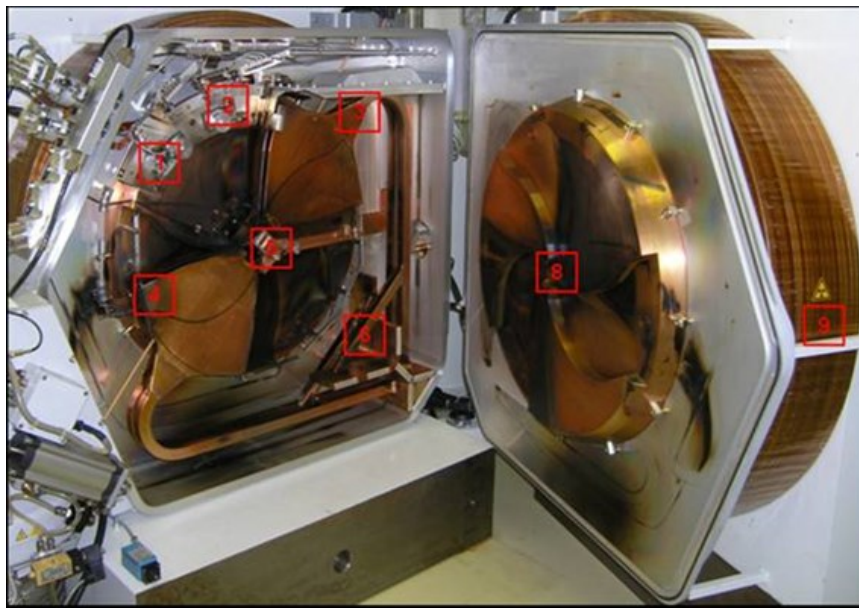
CHAMBER

Chamber Opening

Remove targets	✓
Close target cooling water lines	✓
Visual inspection of door bolts and motor	✓

Measure yoke play, adjust if needed: 5.0

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



Position 1: At 36 cm from Extraction trolley	0.1
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

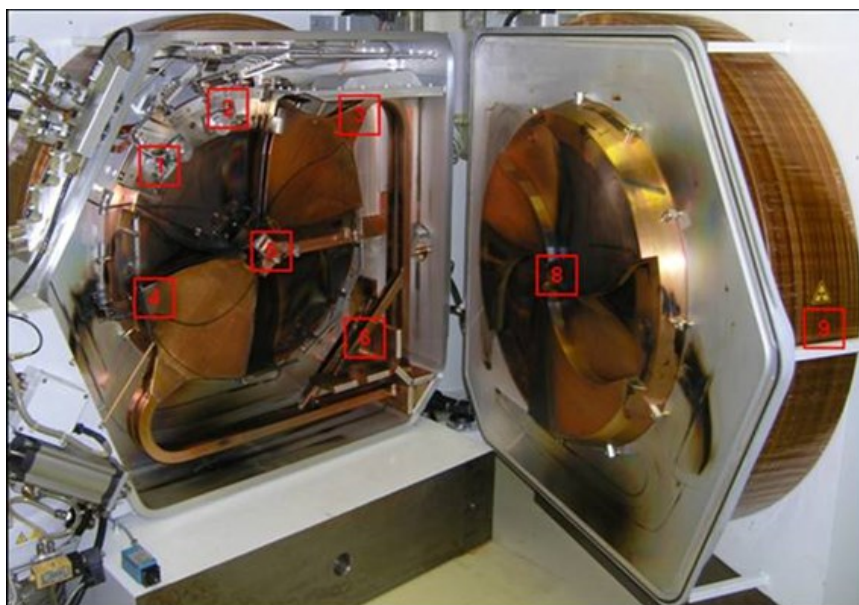
There is not photographic evidence

CHAMBER

Chamber Opening

Remove targets	<input checked="" type="checkbox"/>
Close target cooling water lines	<input checked="" type="checkbox"/>
Visual inspection of door bolts and motor	<input checked="" type="checkbox"/>

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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

There is not photographic evidence

Beam exit valve tests

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

FlapsFlap 1

Calibrate flaps, record minimum and maximum motor current:

Minimum current [mA]	82
MaximumCurrentMA	117

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

0% value [mm]	4.339999999999999
50% value [mm]	11.720000000000001
100% value [mm]	11.720000000000001

Flap 2

Calibrate flaps, record minimum and maximum motor current:

Minimum current [mA]	82
MaximumCurrentMA	117

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

0% value [mm]	4.839999999999999
50% value [mm]	11.82
100% value [mm]	11.82

Central Region

Visual inspection of flip-in probe	<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]
0.450000000000000001	0.75	0.400000000000000002	0.75	0.450000000000000001

Dismount ion source and mount dummy ion source	<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]
0.450000000000000001	0.75	0.400000000000000002	0.75

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

If needed: Adjustment of central region and record A, B, C, D again			
A [mm]	B [mm]	C [mm]	D [mm]
0.930000000000000005	0.450000000000000001	0.5	1.2

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

Restore and record flip-in probe position			
A [mm]	B [mm]	C [mm]	D [mm]
1.189000000000000001	0.333000000000000002	0.450000000000000001	1.100000000000000001

Pictures	
Image	Comments

Dees

Visual inspection of dees, internal and external baffles	<input checked="" type="checkbox"/>
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	Measure dee thickness	Measure dee height
A	33.200000000000003	46.200000000000003
B	33.100000000000001	74.099999999999994
C	33.5	47.100000000000001
D	33.399999999999999	46.399999999999999
E	33.399999999999999	74.299999999999997
F	33.799999999999997	47.100000000000001
G	33.200000000000003	74.900000000000006
H	33.5	75.0

Pictures	
Image	Comments

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

Test each microswitch of extraction system	<input checked="" type="checkbox"/>
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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]	29.399999999999999	29.550000000000001	29.399999999999999
Maximum current [mA]	29.449999999999999	29.449999999999999	29.399999999999999

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	1,115
Target Resistance	1,0005
Lower Collimator Resistance	0,985
Upper Collimator Resistance	4,01
Horizontal Collimator Opening	1,0054
VerticalCollimatorOpening	1,245

	Resistance Measurement	Insulation Measurement
Extraction 1	142.0	101.0
Extraction 2	120.0	133.0

Comments	comment system check
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Chamber Clean-up

Carousel repositioning

Reset foil counter	<input checked="" type="checkbox"/>
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Full picture of vacuum chamber

[Image_19.jpg](#)

Chamber clean-up

Clean dees and magnet poles	<input checked="" type="checkbox"/>
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Check for left items	<input checked="" type="checkbox"/>
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Cabinets

Swedwater

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

Record of water cooling system performance

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

Pictures	
Image	Comments
Image_6.jpg	418

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 no burn marks, loose cables, or water leaks are present,Clean
Repair and/or replace as required	2,5

Take photos (upper and lower compartment)

Image_12.jpg

GSPU inspection

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

Repair and/or replace as required
repla

Take photos

Image_12.jpg

DPA inspection

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

Repair and/or replace as required
repla

Take photos

Image_12.jpg

TPSU back side inspection

Record the resistance of the earth stick	2.5
TPSU back side inspection	Verify that no burn marks, loose cables, or water leaks are present,Clean

Repair and/or replace as required
repair

Take photos

[Image_12.jpg](#)

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

TPSU front side inspection	Verify that no burn marks, loose cables, or water leaks are present
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Repair and/or replace as required
585

Take photos

[Image_12.jpg](#)

RFPG live tests

Record RFPG water cooling pressure	Switch on RFPG main power	Record DPSU voltage [V]	Record DPSU ripple [mV rms]
2.5	<input checked="" type="checkbox"/>	47.81000000000002	1.3400000000000001

Record voltages on phase load detector board (SCU)

3V [V]	TP1 +15V [V]	TP2 -15V [V]	TP3 +5V [V]	TP4 +24V [V]
33.89999999999999	33.89999999999999	33.89999999999999	33.100000000000001	33.299999999999997

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]
0.0	34.0	34.0	1.0	3.0

Turn on Magnet to set value



Record RF parameters in off mode

RFrom SCU Webpage:

DEE voltage ref [V]	33.89999999999999
DEE voltage read 1 [V]	0.0
DEE voltage read 2 [V]	0.0
RF fwd voltage [Vrms]	0.0
RF reflected voltage [Vrms]	0.0
DPA RF FWD voltage [Vrms]	3.0
FWD power [kW]	0.0
Reflected power [kW]	0.0
Anode voltage [kV]	0.0
Anode current [A]	1.99
Grid voltage [V]	-3.0
Grid current [A]	5.000000000000001E-4
Screen voltage [V]	-3.0
Screen current [mA]	2.0
Heater voltage [V rms]	6.21

From PSS:

DEE voltage set [kV]	33.89999999999999
DEE voltage read [kV]	34.0
Delta DEE voltage set [kv]	33.39999999999999
Delta DEE voltage read [kV]	-0.2000000000000001
FWD power [kW]	0.0
Reflected power [kW]	74.0
Flap I start [%]	8.419999999999999
Flap I position [%]	8.000000000000002E-2
Flap II start [%]	7.860000000000003
Flap II position [%]	1.99

Record RF parameters in standby mode

From SCU Webpage:

DEE voltage ref [V]	33.89999999999999
DEE voltage read 1 [V]	34.0
DEE voltage read 2 [V]	35.0
DRF fwd voltage [Vrms]	-2.0
RF reflected voltage [Vrms]	0.0
DPA RF FWD voltage [Vrms]	71.0
FWD power [kW]	8.380000000000008
Reflected power [kW]	2.999999999999999E-2
Anode voltage [kV]	7.929999999999997
Anode current [A]	2.0
Grid voltage [V]	-257.0
Grid current [A]	-0.1197
Screen voltage [V]	849.0
Screen current [mA]	50.0
Heater voltage [V rms]	6.200000000000002

From PSS:

DEE voltage set [kV]	33.89999999999999
DEE voltage read [kV]	0.0
Delta DEE voltage set [kV]	0.0
Delta DEE voltage read [kV]	0.0
FWD power [kV]	0.0
Reflected power [kV]	3.0
Flap I start [%]	0.0
Flap I position [%]	0.0
Flap II start [%]	0.0
Flap II position [%]	0.0
Soft-start RFPG. Start from 25kV / 0kV, ramp up with 1kV / 10s to config value	<input checked="" type="checkbox"/>

Record RF parameters in on mode

From SCU Webpage:

DEE voltage ref [V]	339.0
DEE voltage read 1 [V]	34.0
DEE voltage read 2 [V]	34.899999999999999
RF fwd voltage [Vrms]	-0.20000000000000001
RF reflected voltage [Vrms]	0.0
DPA RF FWD voltage [Vrms]	74.0
FWD power [kW]	8.419999999999999
Reflected power [kW]	8.000000000000002E-2
Anode voltage [kV]	7.860000000000003
Anode current [A]	1.99
Grid voltage [V]	-257.0
Grid current [A]	0.1197
Screen voltage [V]	848.0
Screen current [mA]	51.0
Heater voltage [V rms]	6.219999999999998

From PSS:

DEE voltage set [kV]	33.899999999999999
DEE voltage read [kV]	34.0
Delta DEE voltage set [kV]	35.0
Delta DEE voltage read [kV]	-2.0
FWD power [kW]	0.0
Reflected power [kW]	71.0
Flap I start [%]	8.380000000000008
Flap I position [%]	2.999999999999999E-2
Flap II start [%]	7.929999999999997
Flap II position [%]	2.0
Let the system run for approximately 1-2 hours, monitor parameters, record fastlog, five second log and statistic log, download the SCU logs.	12
Upload files	File_12.pdf

Record RF parameters in on mode again

From SCU Webpage:

DEE voltage ref [V]	34.0
DEE voltage read 1 [V]	34.0
DEE voltage read 2 [V]	1.0
RF fwd voltage [Vrms]	34.899999999999999
RF reflected voltage [Vrms]	8.4000000000000004
DPA RF FWD voltage [Vrms]	0.10000000000000001
FWD power [kW]	4.0
Reflected power [kW]	28.0
Anode voltage [kV]	23.199999999999999
Anode current [A]	7.679999999999997
Grid voltage [V]	2.999999999999999E-2
Grid current [A]	-259.0
Screen voltage [V]	854.0
Screen current [mA]	51.0
Heater voltage [V rms]	6.219999999999998

From PSS:

DEE voltage set [kV]	33.899999999999999
DEE voltage read [kV]	0.0
Delta DEE voltage set [kv]	0.0
Delta DEE voltage read [kV]	0.0
FWD power [kV]	0.0
Reflected power [kV]	3.0
Flap I start [%]	0.0
Flap I position [%]	0.0
Flap II start [%]	0.0
Flap II position [%]	0.0
Turn RFPG off	<input checked="" type="checkbox"/>

Cabinets PSMC

PSMC
Inspect for water leaks, burn marks and broken parts

Verify the resistance values with the installation tester

Resistance between negative and positive [Ω]	Resistance between negative and ground [$M\Omega$]	Resistance between positive and ground [$M\Omega$]
0.34000000000000002	2.21	2.2000000000000002

Real time mesurements
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
7.1399999999999997	1.1000000000000001	10.0

Verify PSMC performance for H-config value

Set current	50.0
Output current [A]	45.600000000000001
Voltage read PSS [V]	4.5
Coil voltage [V]	7.669999999999999
Firing sequence [number of peaks in 20ms]	600.0
Ripple [mV rms]	0.1499999999999999

Verify PSMC performance for 499A

Set current	250.0
Output current [A]	247.6999999999999
Voltage read PSS [V]	43.100000000000001
Coil voltage [V]	38.600000000000001
Firing sequence [number of peaks in 20ms]	600.0
Ripple [mV rms]	0.25

Verify PSMC performance for 250A

Set current	499.0
Output current [A]	499.10000000000002
Voltage read PSS [V]	77.400000000000006
Coil voltage [V]	77.200000000000003
Firing sequence [number of peaks in 20ms]	600.0
Ripple [mV rms]	0.1799999999999999

Verify PSMC performance for 50A

Set current	430.0
Output current [A]	429.5
Voltage read PSS [V]	65.599999999999994
Coil voltage [V]	66.900000000000006
Firing sequence [number of peaks in 20ms]	600.0
Ripple [mV rms]	0.19

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
24.02	15.08	-15.08	4.7699999999999996	0.22

Cabinets PDU

Visual inspection	<input checked="" type="checkbox"/>
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Pictures	
Image	Comments

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

Record H2 gas pressure

Set point [bar]	Reading at MFC [bar]
4.0	4.0

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	36.0	1.5	429.80000000000001	<input checked="" type="checkbox"/>

Record Ion Source Performance

IS current [mA]	IS voltage [V]	Flip in probe current [μ A]
48.0	1282.0	43.0
68.0	1233.0	87.0
98.0	1076.0	154.0
118.0	975.0	204.0
147.0	862.0	268.0
166.0	801.0	310.0
198.0	728.0	363.0

Paper Burn Test

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

Install paper burn target

Image_9.jpg

If needed, adjust collimators and repeat	ds
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LTF

Identifier	LTF4
LTF	If needed, replace LTF peek lines and connectors
Inspect the movement of all LTF compressed air actuators	V3,V4,Syringe

Starting pressure [psi]	Pressure drop [psi / h]
3.109999999999999	1.5900000000000001

If needed: Perform target fill tests and adjustment for each target	500.0
If needed, adjust and repeat test, record adjustment value	122.0

Pictures	
Image	Comments
Image_8.jpg	sft

Autoshield

Check compressor oil level and operational hours	0.45000000000000001
Autoshield	Manually drain the the air tank and the air manifold to evacuate condensated water
Verify tank water level and float switches functionality, top up water level/repair and/or replace switches as required	✓
Verify functionallity of micro switches for: Door closed	✓
Read and record door lift timing for left door	122.0
Read and record door lift timing for right door	123.0
Verify functionallity of skirt microswitches and that the skirts seats properly on the micro switches	✓
Verify tightening of the upper and the lower socket heads screws	✓
Check the hinges of left and right door	✓

Autoshield Upper

Read and record upper manometer lifting pressures

K1	K2	K3	K4	K5	K6
48.0	68.0	98.0	118.0	147.0	166.0

Autoshield Lower

Read and record lower manometer lifting pressures

K1	K2	K3	K4	K5	K6
43.0	87.0	154.0	204.0	268.0	310.0

Pictures

Image	Comments
Image_11.jpg	

Beam Conditioning

Photo name	Add Comment
Image_13.jpg	

PMDebriefing

Record additional tasks performed not recorded elsewhere	Record open tasks and issues	Record spare parts / consumables to be ordered	Record worker dosimetry
<p>Aliquam at vehicula nisi. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia curae; Proin ultricies vulputate sapien vel vestibulum. Suspendisse dictum metus lectus, vitae euismod arcu euismod id. Nulla ornare lectus a ex convallis cursus eget sit amet tellus. Fusce vulputate venenatis eleifend. Curabitur at libero sed ipsum condimentum sollicitudin.</p>	<p>Aliquam at vehicula nisi. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia curae; Proin ultricies vulputate sapien vel vestibulum. Suspendisse dictum metus lectus, vitae euismod arcu euismod id. Nulla ornare lectus a ex convallis cursus eget sit amet tellus. Fusce vulputate venenatis eleifend. Curabitur at libero sed ipsum condimentum sollicitudin. Aliquam at vehicula nisi. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia curae; Proin ultricies vulputate sapien vel vestibulum. Suspendisse dictum metus lectus, vitae euismod arcu euismod id. Nulla ornare lectus a ex convallis cursus eget sit amet tellus. Fusce vulputate venenatis eleifend. Curabitur at libero sed ipsum condimentum sollicitudin.</p>	<p>Aliquam at vehicula nisi. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia curae; Proin ultricies vulputate sapien vel vestibulum. Suspendisse dictum metus lectus, vitae euismod arcu euismod id. Nulla ornare lectus a ex convallis cursus eget sit amet tellus. Fusce vulputate venenatis eleifend. Curabitur at libero sed ipsum condimentum sollicitudin.</p>	<p>455.0</p>