



MAINTENANCE TRACKING TOOL
PETTRACE800

Date:2024-04-18

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

PRE-MAINTENANCE

Registration Date: 2024-04-18

Gas flow(sccm): 5.0

TPG Settings Verifications

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

Notes

tablet keyboard

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

System software

Subsystem	Version
Master:	3.6.3
ACS:	4.3.2
Service System:	3.6.0
Manager:	N/A
Informix (only applicable to SUN-Master Station):	6

Comments

Comments pre-maintenance

Paper Burn Before PM

ciclo



VACUUM

TPG settings verifications

Date: 2024-04-18

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

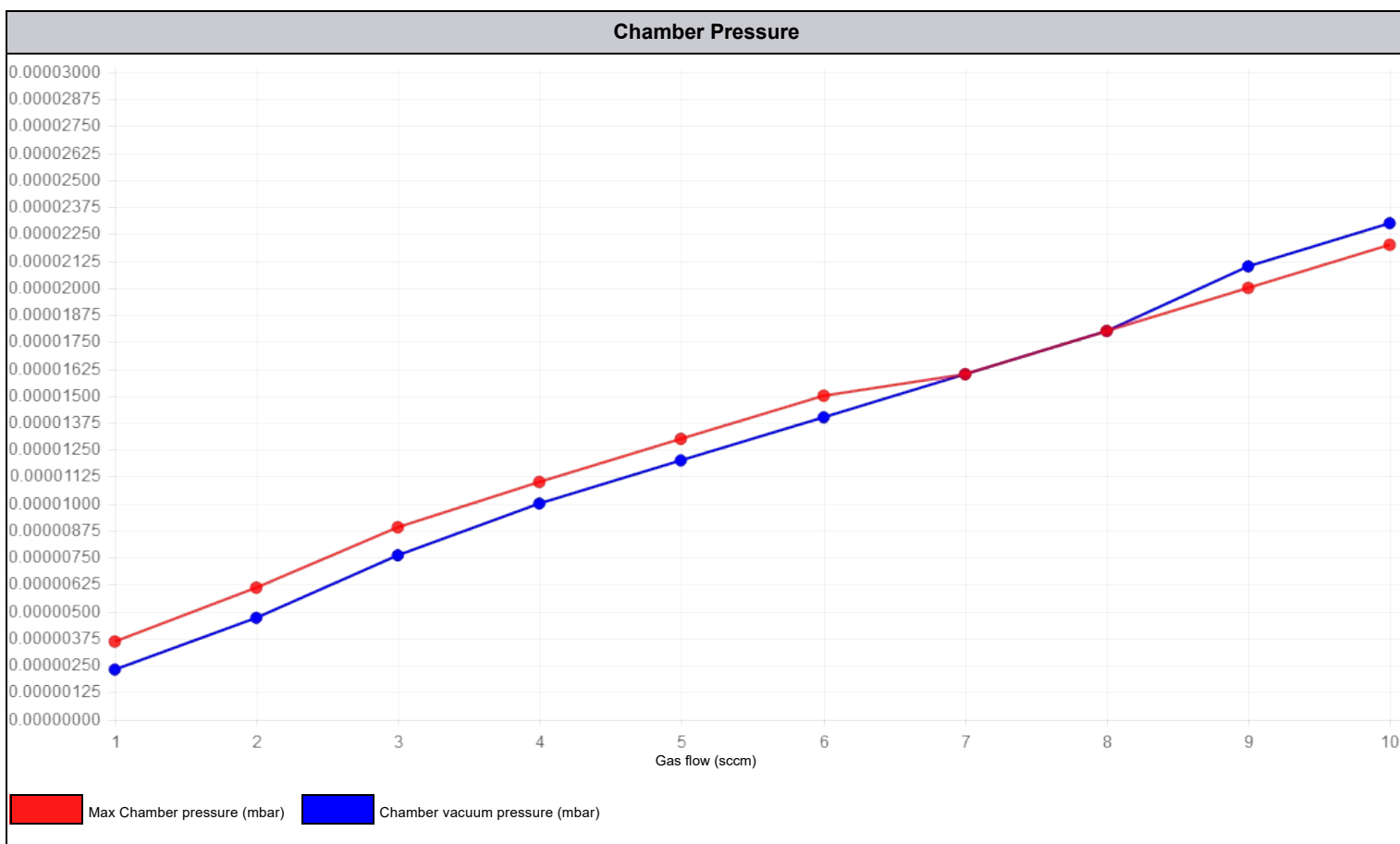
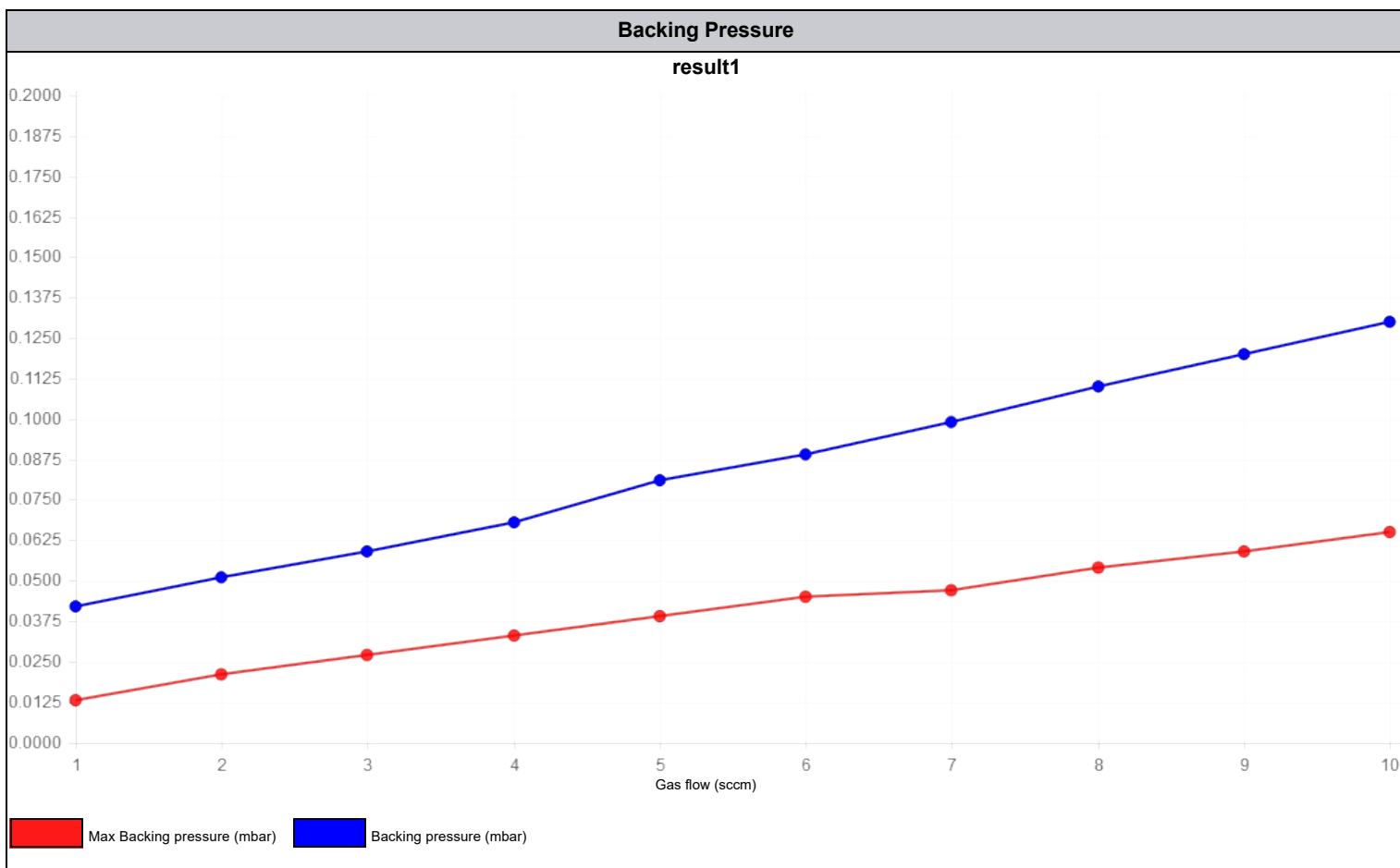
Pressure with gas	Low limit	High limit
1.30E-5	1.80E-5	2.50E-5

Notes

notas tpg

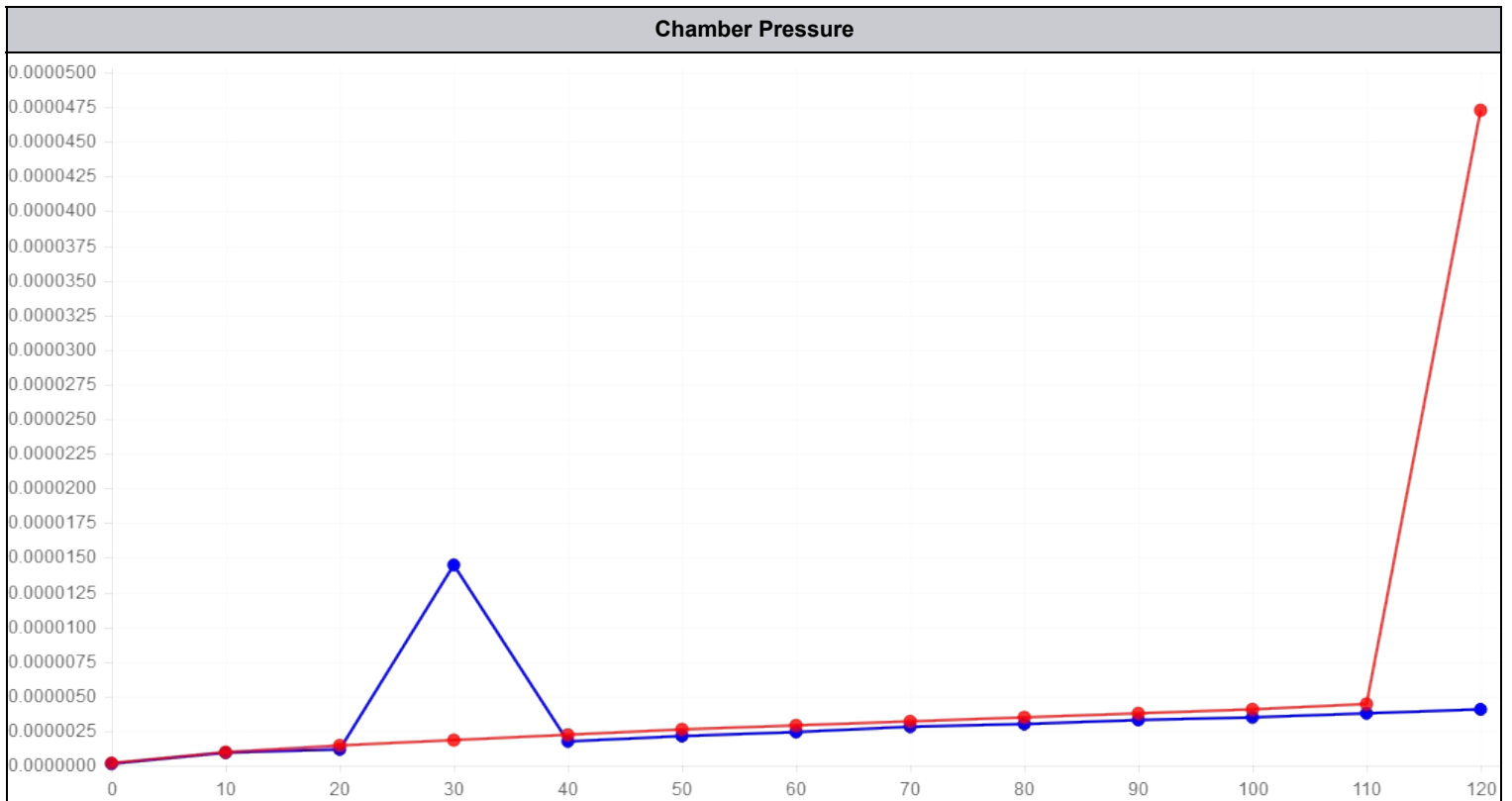
Vacuum MFC curve test

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



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: 2024-04-18

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: 2024-04-17

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

RP Photo



DP Photos

[Photo DP](#)

Notes

note

OtherTest

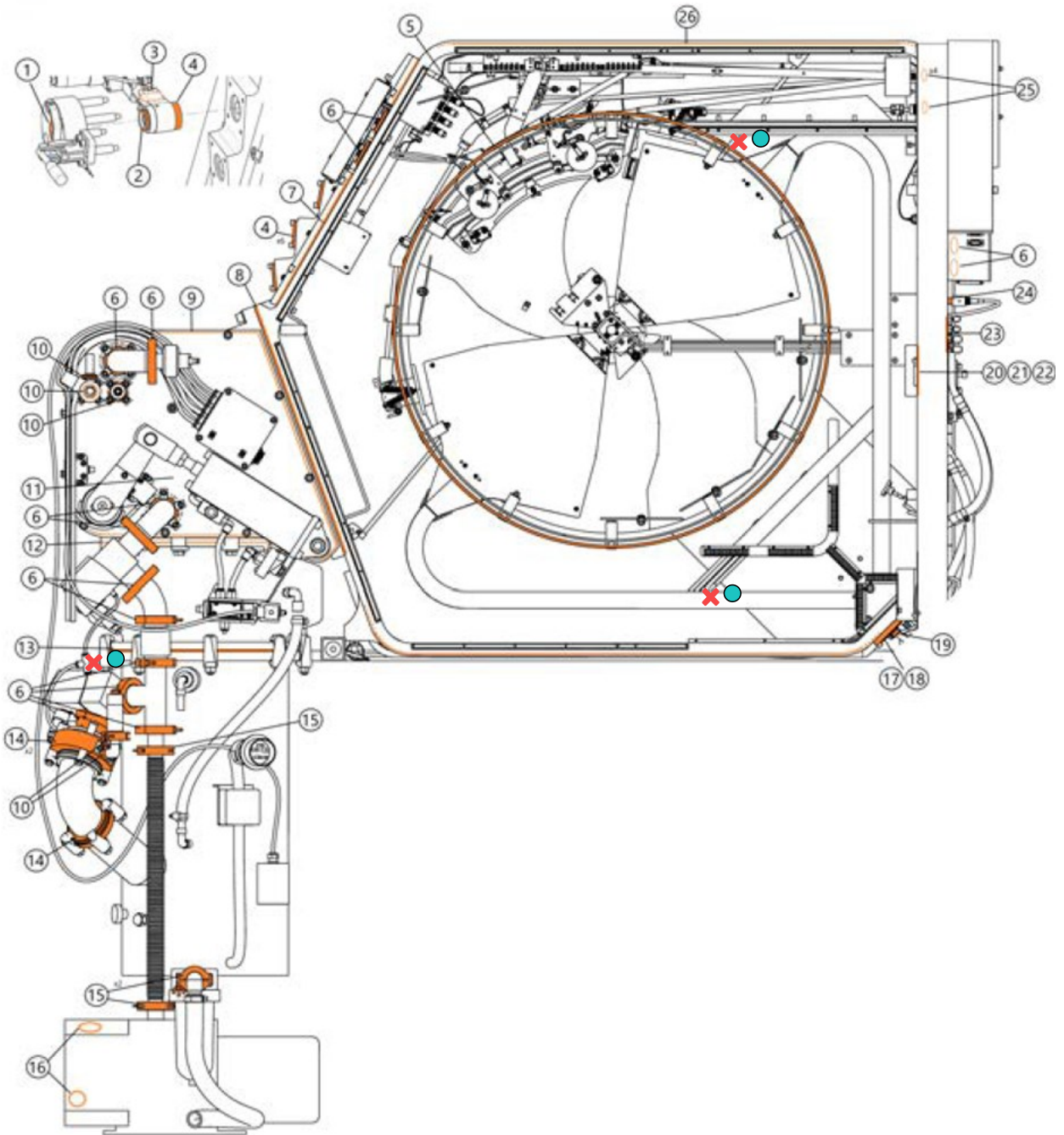
Name the test	other test num 1
Test explanation	a sdas as d ad sa das d sd sada sdasd

Photos or Videos

[ñl](#)

PETtrace800 O-Rings analysis

Pins



Pins Data

Pin			
Name the O-Ring	Name and Info of the O-Ring		Name the O-Ring
	Name of O- Ring	Parameter	
(1) Target port o-ring T1	O-Ring 1	1,2,3	other test num 1
Explain The Intervention			
65			
Photos			
lk_pin_.jpg			

Pin			
Name the O-Ring	Name and Info of the O-Ring		Name the O-Ring
	Name of O- Ring	Parameter	
(3) BEV internal o-ring T4	O-Ring 2	4,5,6	48
Explain The Intervention			
32			
Photos			
23_pin_.jpg			

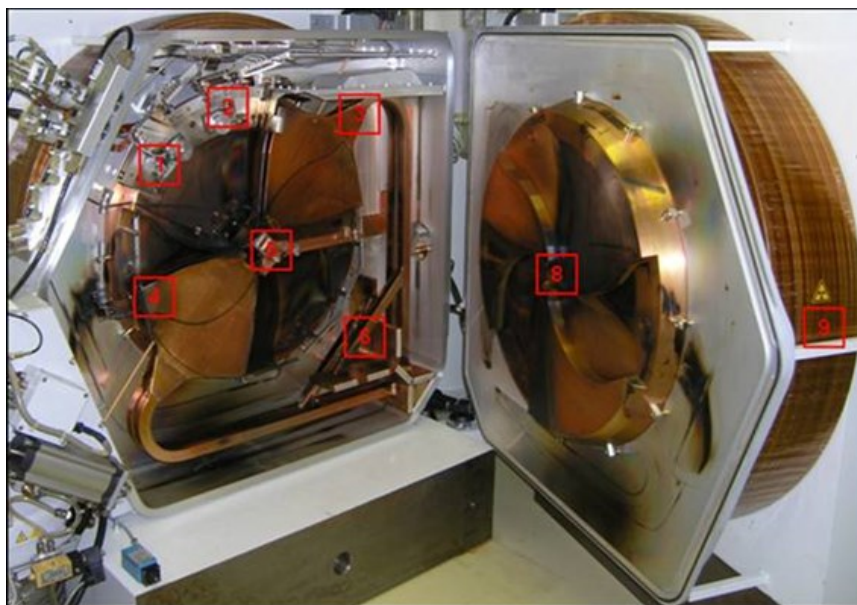
Pin			
Name the O-Ring	Name and Info of the O-Ring		Name the O-Ring
	Name of O- Ring	Parameter	
(4) BEV Peek gasket T3	O-Ring 3	7,8,9	other test num 1
Explain The Intervention			
65			
Photos			
23_pin_.jpg			

CHAMBER

Chamber Opening

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

Measure yoke play, adjust if needed: 5.26

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

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****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"/>

FlapsFlap 1

Calibrate flaps, record minimum and maximum motor current:

Minimum current [mA]	21
MaximumCurrentMA	205

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

0% value [mm]	4.24
50% value [mm]	10.94
100% value [mm]	34.37

Notes

das

Flap 2

Calibrate flaps, record minimum and maximum motor current:

Minimum current [mA]	62
MaximumCurrentMA	108

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

0% value [mm]	5.49
50% value [mm]	13
100% value [mm]	33.47

Notes

asd

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]
52.39	47.32	47.81	81.39	2.25

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]
0.8	1.15	0.5	0.8

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	<input checked="" type="checkbox"/>
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A [mm]	B [mm]	C [mm]	D [mm]
1	2	3	4

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	<input checked="" type="checkbox"/>
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A [mm]	B [mm]	C [mm]	D [mm]
53.02	47.77	47.6	80.3

Pictures	
Image	Comments
CentralRegion_16.jpg	45

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	47.23
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
Dees_5.jpg	65

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"/>
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	29.5
Extraction 2	50	100

Comments	adjust
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Chamber Clean-up

Carousel repositioning

Install back carousels	<input checked="" type="checkbox"/>
Foil change test on each carousel	<input checked="" type="checkbox"/>
Reset foil counter	<input checked="" type="checkbox"/>

Full picture of vacuum chamber[Image_7.jpg](#)

Chamber clean-up

Clean dees and magnet poles	<input checked="" type="checkbox"/>
Check for left items	<input checked="" type="checkbox"/>
Inspect RF finger contacts	<input checked="" type="checkbox"/>

Cabinets

Swedewater

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

Record of water cooling system performance

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

Pictures	
Image	Comments
Image_14.jpg	as

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
Repair and/or replace as required	replace

Take photos (upper and lower compartment)

Image_4.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
repair

Take photos

Image_4.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
repair

Take photos

Image_4.jpg

TPSU back side inspection

Record the resistance of the earth stick	32.100000000000001
TPSU back side inspection	Install earth stick,Verify that no burn marks, loose cables, or water leaks are present,Clean,Check the status of all 48 diodes with the multimeter

Repair and/or replace as required
replace

Take photos



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
replace

Take photos



RFPG live tests

Record RFPG water cooling pressure	Switch on RFPG main power	Record DPSU voltage [V]	Record DPSU ripple [mV rms]
40	<input checked="" type="checkbox"/>	13	12

Record voltages on phase load detector board (SCU)

3V [V]	TP1 +15V [V]	TP2 -15V [V]	TP3 +5V [V]	TP4 +24V [V]
1	2	3	4	5

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	7	8	9	10

Turn on Magnet to set value



Record RF parameters in off mode

RFrom SCU Webpage:

DEE voltage ref [V]	11
DEE voltage read 1 [V]	12
DEE voltage read 2 [V]	13
RF fwd voltage [Vrms]	14
RF reflected voltage [Vrms]	15
DPA RF FWD voltage [Vrms]	16
FWD power [kW]	17
Reflected power [kW]	18
Anode voltage [kV]	19
Anode current [A]	71
Grid voltage [V]	21
Grid current [A]	22
Screen voltage [V]	23
Screen current [mA]	24
Heater voltage [V rms]	25

From PSS:

DEE voltage set [kV]	2.60E+1
DEE voltage read [kV]	27
Delta DEE voltage set [kV]	28
Delta DEE voltage read [kV]	29
FWD power [kW]	30
Reflected power [kW]	31
Flap I start [%]	3.20E+1
Flap I position [%]	33
Flap II start [%]	34
Flap II position [%]	35

Record RF parameters in standby mode

From SCU Webpage:

DEE voltage ref [V]	36
DEE voltage read 1 [V]	37
DEE voltage read 2 [V]	38
DRF fwd voltage [Vrms]	39
RF reflected voltage [Vrms]	40
DPA RF FWD voltage [Vrms]	41
FWD power [kW]	42
Reflected power [kW]	43
Anode voltage [kV]	44
Anode current [A]	45
Grid voltage [V]	46
Grid current [A]	47
Screen voltage [V]	48
Screen current [mA]	49
Heater voltage [V rms]	50

From PSS:

DEE voltage set [kV]	51
DEE voltage read [kV]	52
Delta DEE voltage set [kv]	53
Delta DEE voltage read [kV]	54
FWD power [kV]	56
Reflected power [kV]	57
Flap I start [%]	58.0
Flap I position [%]	59.0
Flap II start [%]	60.0
Flap II position [%]	61.0
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]	62
DEE voltage read 1 [V]	63
DEE voltage read 2 [V]	64
RF fwd voltage [Vrms]	65
RF reflected voltage [Vrms]	66
DPA RF FWD voltage [Vrms]	67
FWD power [kW]	68
Reflected power [kW]	69
Anode voltage [kV]	70
Anode current [A]	71
Grid voltage [V]	72
Grid current [A]	73
Screen voltage [V]	74
Screen current [mA]	75
Heater voltage [V rms]	76

From PSS:

DEE voltage set [kV]	77
DEE voltage read [kV]	78
Delta DEE voltage set [kV]	79
Delta DEE voltage read [kV]	80
FWD power [kW]	81
Reflected power [kW]	79
Flap I start [%]	83.0
Flap I position [%]	84.0
Flap II start [%]	85.0
Flap II position [%]	86.0
Let the system run for approximately 1-2 hours, monitor parameters, record fastlog, five second log and statistic log, download the SCU logs.	87
Upload files	File_4.pdf

Record RF parameters in on mode again

From SCU Webpage:

DEE voltage ref [V]	88
DEE voltage read 1 [V]	89
DEE voltage read 2 [V]	90
RF fwd voltage [Vrms]	91
RF reflected voltage [Vrms]	92
DPA RF FWD voltage [Vrms]	93
FWD power [kW]	94
Reflected power [kW]	95
Anode voltage [kV]	96
Anode current [A]	97
Grid voltage [V]	98
Grid current [A]	99
Screen voltage [V]	1
Screen current [mA]	2
Heater voltage [V rms]	3

From PSS:

DEE voltage set [kV]	4
DEE voltage read [kV]	5
Delta DEE voltage set [kv]	6
Delta DEE voltage read [kV]	7
FWD power [kV]	8
Reflected power [kV]	9
Flap I start [%]	10.0
Flap I position [%]	11.0
Flap II start [%]	12.0
Flap II position [%]	13.0
Turn RFPG off	<input checked="" type="checkbox"/>

Cabinets PSMC**PSMC**

Open PSMC back door and side covers, 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 [$M\Omega$]
56	5	56

Real time measurements

Install multimeter probes on positive and negative, guide them through the air outlet grid, connect oscilloscope, Ramp up the magnet to the H- configuration value, read and record the ramping time, Verify interlock functionality, Verify fan functionality

Record on sequence ramping speed	Record on sequence ramping up time to maximum	Record on sequence ramping up time to configuration value
4	5	6

Verify PSMC performance for H-config value

Set current	7
Output current [A]	8
Voltage read PSS [V]	9
Coil voltage [V]	4
Firing sequence [number of peaks in 20ms]	5
Ripple [mV rms]	6

Verify PSMC performance for 499A

Set current	78
Output current [A]	6
Voltage read PSS [V]	4
Coil voltage [V]	7
Firing sequence [number of peaks in 20ms]	8
Ripple [mV rms]	9

Verify PSMC performance for 250A

Set current	4
Output current [A]	5
Voltage read PSS [V]	6
Coil voltage [V]	41
Firing sequence [number of peaks in 20ms]	5
Ripple [mV rms]	7

Verify PSMC performance for 50A

Set current	8
Output current [A]	4
Voltage read PSS [V]	5
Coil voltage [V]	9
Firing sequence [number of peaks in 20ms]	5
Ripple [mV rms]	1

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	15.2	14.5	6	100

Cabinets PDU

Visual inspection	<input checked="" type="checkbox"/>
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Pictures	
Image	Comments
Image 3.jpg	asd

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

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 [μ A]
10	1088	1
19	1167	3.5
22	1189	4.8
25	1220	6.7
28	1252	8.9
31	1287	10.7
37	1324	16.6

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_13.jpg Image_14.jpg Image_15.jpg
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If needed, adjust collimators and repeat	sf df sd ffd sd f s
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LTF

Identifier	LTF1
LTF	Install back targets
Inspect the movement of all LTF compressed air actuators	V2,V3,V4,Syringe

Starting pressure [psi]	Pressure drop [psi / h]
402.8	9.96

If needed: Perform target fill tests and adjustment for each target	500
If needed, adjust and repeat test, record adjustment value	501

Pictures	
Image	Comments
Image_10.jpg	654

Autoshield

Check compressor oil level and operational hours	4.0
Autoshield	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	4.0
Read and record door lift timing for right door	5.0
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
1.0	2.0	3.0	4.0	5.0	6.0

Pictures

Image	Comments
Image_3.jpg	465

Beam Conditioning

Photo name	Add Comment
Image_6.jpg	No comments

PMDebriefing

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]
645	465	654	dfg hg hff	565