UiB NanoStructures Laboratory

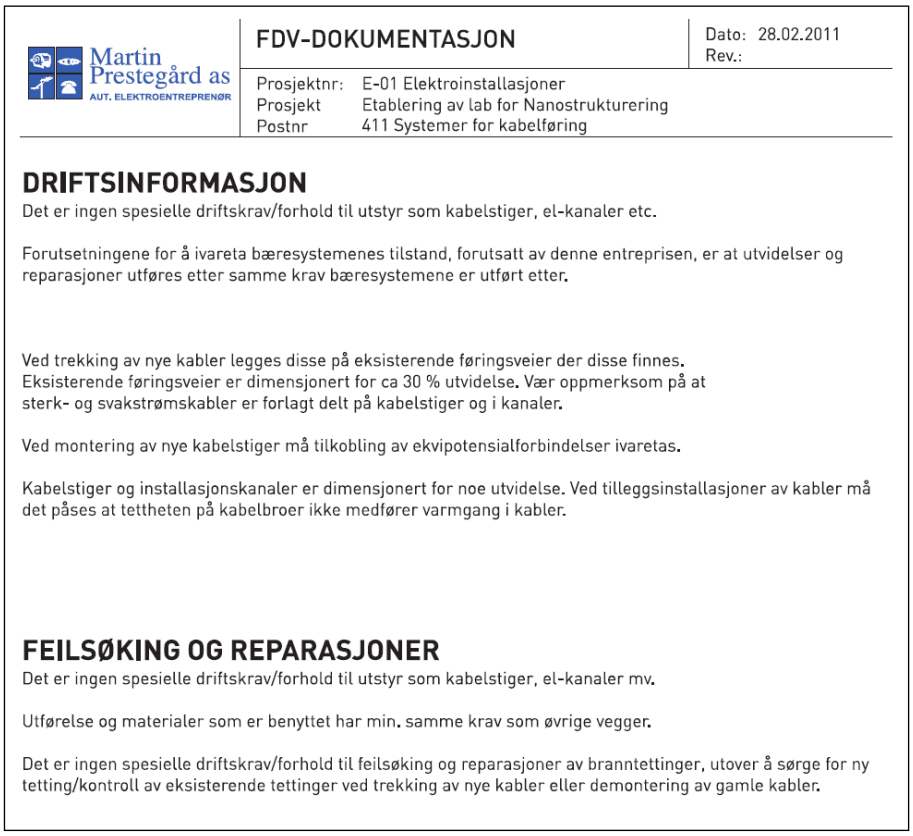
Laboratory Facilities

This document summarizes the facilities available in UiB's NanoStructures Lab. First of all, here is a list of the people and companies that were involved in setting up the laboratory:

- Bodil Holst (Tel: +47 55 58 29 67, Mob: +47 476 07 608, E-mail: Bodil.Holst@ift.uib.no)
- Martin Møller Greve (Tel: +47 55 58 83 26, Mob.: +47 900 79 974, E-Mail: Martin.Greve@ift.uib.no)
- Rachid Maad (Tel: +47 55 58 27 63, Mob:, E-Mail: Rachid.Maad@ift.uib.no)
- Xiaodong Guo (Tel: +47 55 58 83 27, Mob:, E-mail: Xiaodong.Guo@ift.uib.no)
- Thomas Reisinger (IFT, treisinger@gmail.com): PhD student. Scientific requirements and selection of tools
- Gjert Furhovden (IFT): IFT administrasjon. Helped with UiB communication/politics.
- Sverre Seth (EIA): Project leader appointed by the Eiendomsavdelingen (EIA). Left the project prematurely in July 2011.
- Lars Christensen (Abo-ARK/EIA, lars@abo-ark.no): Project leader who replaced Sverre, and was called in specifically for the project from Abo-ARK by EIA.
- Eivind Moe (COWI, eim@cowi.no, +47 950 83 688): External consultant for EIA
- Øivind Berg (YIT, oivind.b.berg@yit.no): Project manager overseeing installations supplied by YIT (Fumehoods/Ventilation)
- Stian Leikanger (YIT): Installation engineer at YIT. Most notably programming of ventilation regulation
- Karsten Gilde (YIT): worked with Stian
- Åge Sørensen (Handegård & Pedersen AS, a-sorens@handped.no): Electricity consultant (RIE)
- Ole Dankertsen (Martin Prestegård, ole@prestegard.no, Tel 55525320, Mob. 98221472) Saksbehandler electric installation
- Ørjan Fosså (Martin Prestegård,Telefon 98221483): Carried out most of the electric installation.
- Leif Kvamme (Martin Prestegård,Telefon 98221474): Montør. Mainly earth installation for Temescal and RIE.
- Tom Svendsen (GK, Tom.Svendsen@gk.no, +47 950 01 040): Planned cold-water system
- Truls Wie Perdersen (GK, Truls.Wie-Pedersen@gk.no): not sure what he did
- Petter Bjådal (GK, petter.bjaadal@gk.no): not sure what he did
- Tor Atle Myrmel (GK,41255867) Service engineer
- Kenneth (GK, 45237494) Service engineer
- Rune Hovland (Oras, Rune.Hovland@oras.no, 95297845): Rørlegger management
- Christian (Oras, 95297847): Rørlegger. Did most of the installation. Also tuning of pressures in Cold water system. Call him if there is a problem with the cold water system.
- Roger Hatlen (RHA Gass&Rørmontasje, 92039521) Nitrogen gas pipe installations
- B. Morstøl (Byggmester Morstøl AS). Subroom in 168 and removal of ceiling in 268 and perhaps some other building work (doors?)
- Frank Krogenæs (KL-Klima AS, frank@kl-klima.no, 47618157): Installation of humidifier
- Odd Olav Fosso (F-Tech AS, Mob: +4798298211, ofosso@f-tech.no) Consultant for Humidifier installation
- Dr. Michael Rüb (MCRT, michael.rueb@mcrt.de, +49-171-7903158) Service and Design Engineer

- Dr. Maximilian Dobler (MCRT, maximilian.dobler@mcrt.de, +49-151-21250429) Sales Manager
- Arnfinn Reines (Yara Praxair, arnfinn.reines@yarapraxair.com, (+47) 90966357) Engineering
- Ann-Kristin Lodgaard (Yara Praxair, Ann-Kristin.Lodgaard@yarapraxair.com, (+47) 976 81 143) Sales

1. Electricity (M.Prestegård)



Martin Prestegård as
AUT. ELEKTROENTREPRENØR

FDV-DOKUMENTASJON

Dato: 28.02.2011
Rev.:

Prosjektnr: E-01 Elektroinstallasjoner
Prosjekt Etablering av lab for Nanostrukturering
Postnr 411 Systemer for kabelføring

DRIFTSINFORMASJON

Det er ingen spesielle driftskrav/forhold til utstyr som kabelstiger, el-kanaler etc.

Forutsetningene for å ivareta bæresystemenes tilstand, forutsatt av denne entreprisen, er at utvidelser og reparasjoner utføres etter samme krav bæresystemene er utført etter.

Ved trekking av nye kabler legges disse på eksisterende føringsveier der disse finnes.
Eksisterende føringsveier er dimensjonert for ca 30 % utvidelse. Vær oppmerksom på at sterk- og svakstrømskabler er forlagt delt på kabelstiger og i kanaler.

Ved montering av nye kabelstiger må tilkobling av ekvipotensialforbindelser ivaretas.

Kabelstiger og installasjonskanaler er dimensjonert for noe utvidelse. Ved tilleggsinstallasjoner av kabler må det påses at tettheten på kabelbroer ikke medfører varmgang i kabler.

FEILSØKING OG REPARASJONER

Det er ingen spesielle driftskrav/forhold til utstyr som kabelstiger, el-kanaler mv.

Utførelse og materialer som er benyttet har min. samme krav som øvrige vegger.

Det er ingen spesielle driftskrav/forhold til feilsøking og reparasjoner av branntettinger, utover å sørge for ny tetting/kontroll av eksisterende tettinger ved trekking av nye kabler eller demontering av gamle kabler.

Figure 1: Taken from Prestegård FDV dokumentasjon (FDV = Forvaltning, Drift og Vedlikehold).

Martin Prestegård as
AUT. ELEKTROENTREPRENØR

FDV-DOKUMENTASJON

Dato: 28.02.2011
Rev.:

Prosjektnr: E-01 Elektroinstallasjoner
Prosjekt Etablering av lab for Nanostrukturering
Postnr 411 Systemer for kabelføring

PERIODISK VEDLIKEHOLD

Det er ingen spesielle forhold for periodisk vedlikehold av utstyr som kabelstiger, el-kanaler mv.

Som endel av internkontrollrutinene kontrolleres årlig at bæresystemene ikke har brekkasje el. Dette er en visuell kontroll, og gjelder i hovedsak synlig utstyr.

Kabelbroer med fester skal visuelt undersøkes med hensyn til at nedbøying ikke overstiger 0,5 % av konsollavstanden.

Alle brannsikre gjennomføringer er merket, kontroller visuelt at merkeskilt/merkelapp ikke er blitt borte eller at teksten ikke lenger er leselig.

Det påhviler tiltakshaver/leietaker og påse at branntetting blir utført ved trekking av nye kabler.

Det påhviler tiltakshaver/leietaker å kontrollere at eksisterende branntetting innehar nødvendig funksjon. Dette utføres som visuell kontroll.

Det er meget viktig at det blir branntettet forskriftsmessig ved enhver forandring i kabelnettet (montering/demontering).

HENVISNINGER

Det vises til plantegningene for hvor føringsveiene er inntegnet.

Plantegninger

Brosjyreblad

Det vises til vedlagte brosjyreblad for info om utstyr som er benyttet til bæresystemer.

Figure 2: Taken from Prestegård FDV dokumentasjon (FDV = Forvaltning, Drift og Vedlikehold).

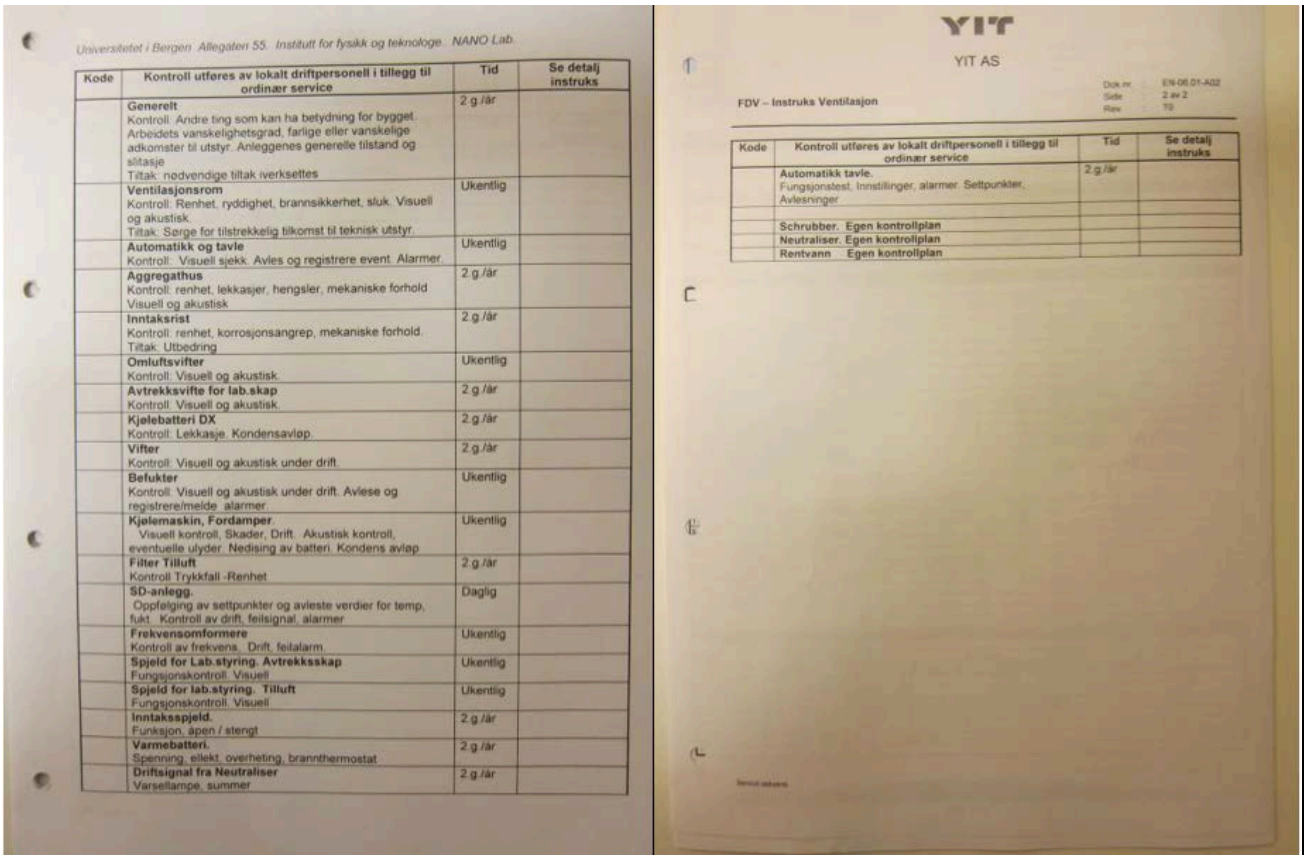
2. **Closed-cycle cooling water = isvann (YIT/ORAS/HDK AS)**

3. **Ventilation and Air-conditioning (YIT/GK)**

4. **Outer lab fumehood (YIT/KILAB)**

5. **Humidifier = befukter (YIT/KL-Klima AS/F-Tech AS)**

Various documents regarding the humidifier:



Universitetet i Bergen. Allegaten 55. Institutt for fysikk og teknologi. NANO Lab.

Kode	Kontroll utføres av lokalt driftpersonell i tillegg til ordinær service	Tid	Se detalj instruks
	Generelt Kontroll: Andre ting som kan ha betydning for bygget. Arbeidets vanskelighetsgrad, farlige eller vanskelige adkomster til utstyr. Anleggenes generelle tilstand og slitasje Tiltak: nødvendige tiltak iverksettes	2 g./år	
	Ventilasjonsrom Kontroll: Renhet, ryddighet, brannsikkerhet, sluk. Visuell og akustisk. Tiltak: Sørge for tilstrekkelig tilkomst til teknisk utstyr.	Ukentlig	
	Automatikk og tavle Kontroll: Visuell sjekk. Avles og registrere event. Alarmer.	Ukentlig	
	Aggregathus Kontroll: renhet, lekkasjer, hengsler, mekaniske forhold Visuell og akustisk	2 g./år	
	Inntaksrist Kontroll: renhet, korrosjonsangrep, mekaniske forhold. Tiltak: Utbedring	2 g./år	
	Omluftsvifter Kontroll: Visuell og akustisk.	Ukentlig	
	Avtrekksvifte for lab.skap Kontroll: Visuell og akustisk.	2 g./år	
	Kjølebatteri DX Kontroll: Lekkasje. Kondensavløp.	2 g./år	
	Vifter Kontroll: Visuell og akustisk under drift.	2 g./år	
	Befukter Kontroll: Visuell og akustisk under drift. Avlese og registrere/melde alarmer.	Ukentlig	
	Kjølemaskin, Fordamper. Visuell kontroll, Skader, Drift. Akustisk kontroll, eventuelle ulyder. Nedising av batteri. Kondens avløp	Ukentlig	
	Filter Tilluft Kontroll Trykkfall -Renhet	2 g./år	
	SD-anlegg. Oppfølging av settpunkter og avleste verdier for temp, fukt. Kontroll av drift, feilsignal, alarmer	Daglig	
	Frekvensomformere Kontroll av frekvens. Drift, feilalarm.	Ukentlig	
	Spjeld for Lab.styring. Avtrekksskap Fungsjonskontroll. Visuell	Ukentlig	
	Spjeld for lab.styring. Tilluft Fungsjonskontroll. Visuell	Ukentlig	
	Inntaksspjeld. Funksjon, åpen / stengt	2 g./år	
	Varmebatteri. Spenning, ellekt. overheting, brannthermostat	2 g./år	
	Driftsignal fra Neutraliser Varsellampe, summer	2 g./år	

YIT

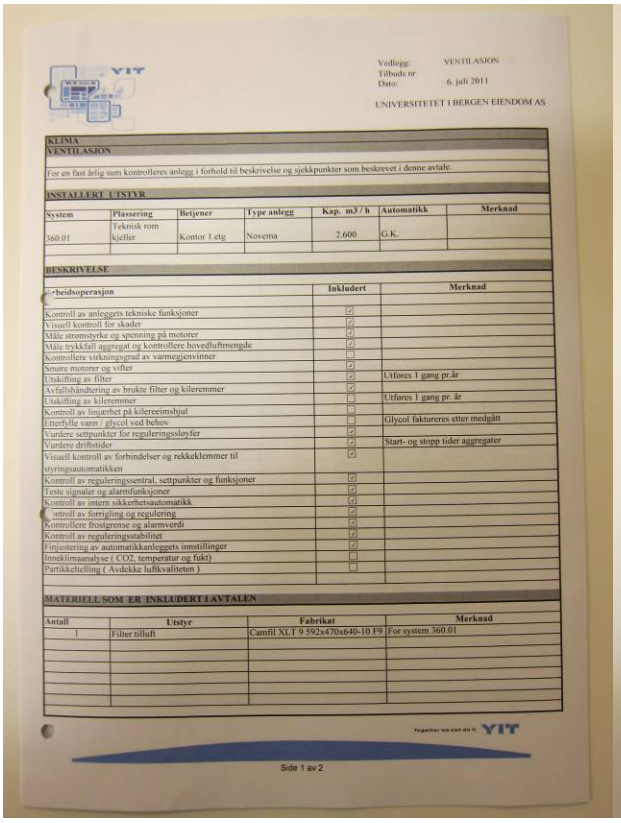
YIT AS

FDV – Instruks Ventilasjon

Dok.nr: EN-06.01-A02
Side: 2 av 2
Rev: T0

Kode	Kontroll utføres av lokalt driftpersonell i tillegg til ordinær service	Tid	Se detalj instruks
	Automatikk tavle. Fungsjonstest, Innstillinger, alarmer. Settpunkter, Avlesninger	2 g./år	
	Schrubber. Egen kontrollplan		
	Neutraliser. Egen kontrollplan		
	Rentvann Egen kontrollplan		

Figure 3: Control plan.



Vedlegg: VENTILASJON
Tilbuds nr
Dato: 6. juli 2011

UNIVERSITETET I BERGEN EIENDOM AS

KLIMA
VENTILASJON

For en fast årlig sum kontrolleres anlegg i forhold til beskrivelse og sjekkpunkter som beskrevet i denne avtale.

INSTALLERT UTSTYR

System	Plassering	Betjener	Type anlegg	Kap. m3 / h	Automatikk	Merknad
360.01	Teknisk rom kjeller	Kontor 1.etg	Novema	2.600	G.K.	

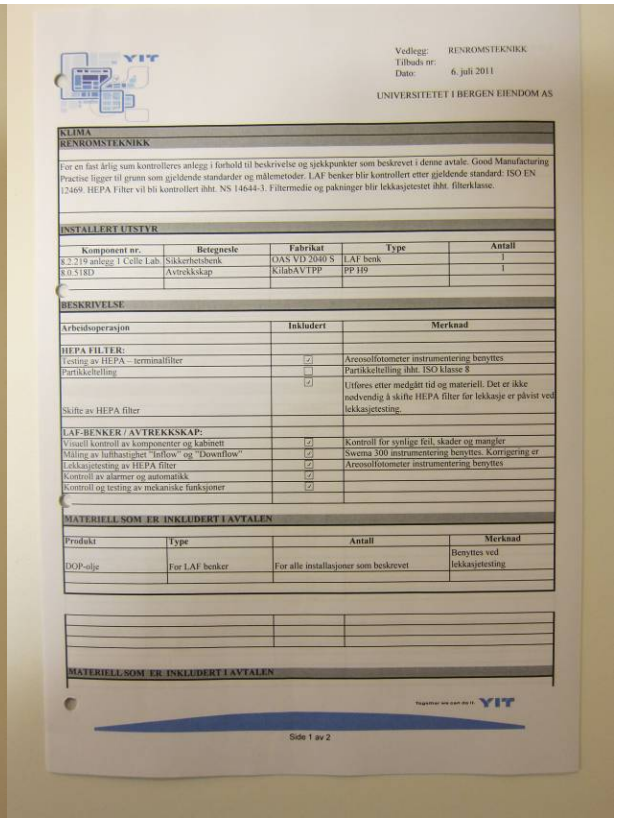
BESKRIVELSE

Arbeidsoperasjon	Inkludert	Merknad
Kontroll av anleggets tekniske funksjoner	☑	
Visuell kontroll for skader	☑	
Måle strømstyrke og spenning på motorer	☑	
Måle trykkfall aggregat og kontrollere hovedluftmengde	☑	
Kontrollere virkningsgrad av varmegjenvinner	☐	
Smøre motorer og vifter	☑	
Utskifting av filter	☑	Utføres 1 gang pr.år
Avfallshåndtering av brukte filter og kileremmer	☑	
Utskifting av kileremmer	☐	Utføres 1 gang pr. år
Kontroll av linjærhet på kilereeimshjul	☐	
Etterfylle vann / glycol ved behov	☐	Glycol faktureres etter medgått
Vurdere settpunkter for reguleringssløyfer	☑	
Vurdere driftstider	☑	Start- og stopp tider aggregater
Visuell kontroll av forbindelser og rekkeklemmer til styringsautomatikken	☑	
Kontroll av reguleringssentral, settpunkter og funksjoner	☑	
Teste signaler og alarmfunksjoner	☑	
Kontroll av intern sikkerhetsautomatikk	☑	
Kontroll av forrigling og regulering	☑	
Kontrollere frostgrense og alarmverdi	☑	
Kontroll av reguleringsstabilitet	☑	
Finjustering av automatikkanleggets innstillinger	☑	
Inneklimaanalyse (CO2, temperatur og fukt)	☐	
Partikkeltelling (Avdekke luftkvaliteten)	☐	

MATERIELL SOM ER INKLUDERT I AVTALEN

Antall	Utstyr	Fabrikat	Merknad
1	Filter tilluft	Camfil XLT 9 592x470x640-10 F9	For system 360.01

Side 1 av 2



Vedlegg: RENROMSTEKNIKK
Tilbuds nr:
Dato: 6. juli 2011

UNIVERSITETET I BERGEN EIENDOM AS

KLIMA
RENROMSTEKNIKK

For en fast årlig sum kontrolleres anlegg i forhold til beskrivelse og sjekkpunkter som beskrevet i denne avtale. Good Manufacturing Practise ligger til grunn som gjeldende standarder og målemetoder. LAF benker blir kontrollert etter gjeldende standard: ISO EN 12469. HEPA Filter vil bli kontrollert ihht. NS 14644-3. Filtermedie og pakninger blir lekkasjetestet ihht. filterklasse.

INSTALLERT UTSTYR

Komponent nr.	Betegnelse	Fabrikat	Type	Antall
8.2.2 I 9 anlegg 1 Celle Lab.	Sikkerhetsbenk	OAS VD 2040 S	LAF benk	1
8.0.518D	Avtrekkskap	KilabAVTPP	PP H9	1

BESKRIVELSE

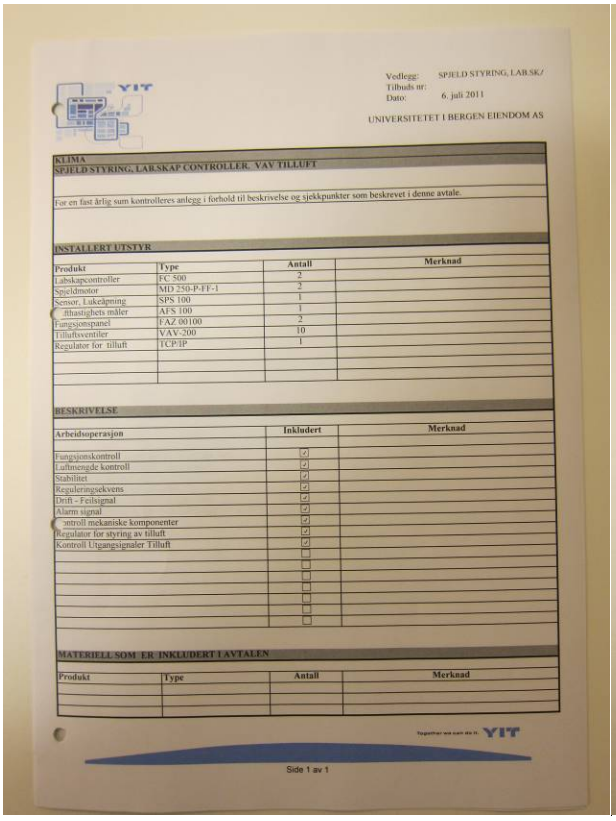
Arbeidsoperasjon	Inkludert	Merknad
HEPA FILTER:		
Testing av HEPA – terminalfilter	☑	Areosolfotometer instrumentering benyttes
Partikkeltelling	☐	Partikkeltelling ihht. ISO klasse 8
Skifte av HEPA filter	☑	Utføres etter medgått tid og materiell. Det er ikke nødvendig å skifte HEPA filter for lekkasje er påvist ved lekkasjetesting.
LAF-BENKER / AVTREKKSKAP:		
Visuell kontroll av komponenter og kabinett	☑	Kontroll for synlige feil, skader og mangler
Måling av lufthastighet "Inflow" og "Downflow"	☑	Swema 300 instrumentering benyttes. Korrigering er
Lekkasjetesting av HEPA filter	☑	Areosolfotometer instrumentering benyttes
Kontroll av alarmer og automatikk	☑	
Kontroll og testing av mekaniske funksjoner	☑	

MATERIELL SOM ER INKLUDERT I AVTALEN

Produkt	Type	Antall	Merknad
DOP-olje	For LAF benker	For alle installasjoner som beskrevet	Benyttes ved lekkasjetesting

MATERIELL SOM ER INKLUDERT I AVTALEN

Side 1 av 2



Vedlegg: SPJELD STYRING, LAB.SK/
Tilbuds nr:
Dato: 6. juli 2011

UNIVERSITETET I BERGEN EIENDOM AS

KLIMA
SPJELD STYRING, LAB.SKAP CONTROLLER, VAV TILLUFT

For en fast årlig sum kontrolleres anlegg i forhold til beskrivelse og sjekkpunkter som beskrevet i denne avtale.

INSTALLERT UTSTYR

Produkt	Type	Antall	Merknad
Labskapcontroller	FC 500	2	
Spjeldmotor	MD 250-P/FF-1	2	
Sensor, Lukeåpning	SPS 100	1	
Lufthastighets måler	AFS 100	1	
Fungsionspanel	FAZ 00100	2	
Tilluftsventiler	VAV-200	10	
Regulator for tilluft	TCP/IP	1	

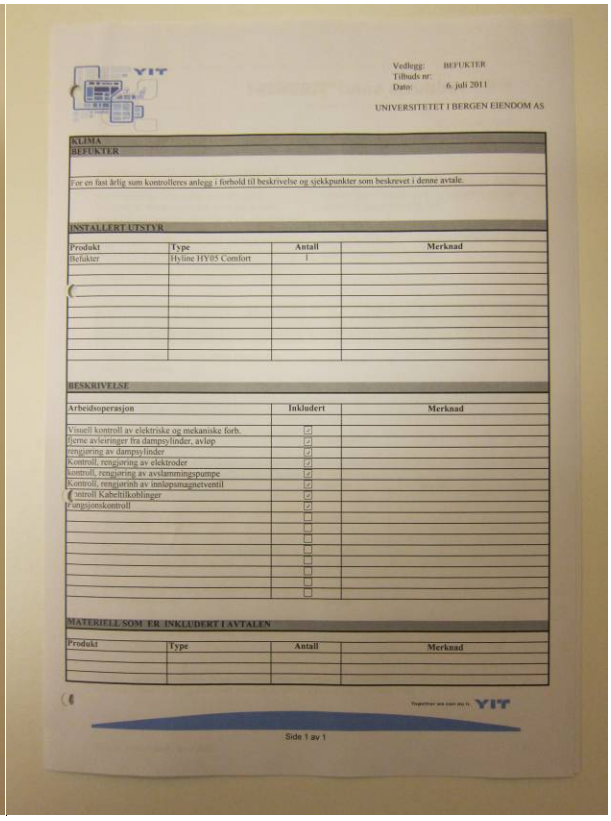
BESKRIVELSE

Arbeidsoperasjon	Inkludert	Merknad
Fungsjonskontroll	☑	
Luftmengde kontroll	☑	
Stabilitet	☑	
Reguleringsekvens	☑	
Drift - Feilsignal	☑	
Alarm signal	☑	
Kontroll mekaniske komponenter	☑	
Regulator for styring av tilluft	☑	
Kontroll Utgangsignaler Tilluft	☑	

MATERIELL SOM ER INKLUDERT I AVTALEN

Produkt	Type	Antall	Merknad

Side 1 av 1



Vedlegg: BEFUKTER
Tilbuds nr:
Dato: 6. juli 2011

UNIVERSITETET I BERGEN EIENDOM AS

KLIMA
BEFUKTER

For en fast årlig sum kontrolleres anlegg i forhold til beskrivelse og sjekkpunkter som beskrevet i denne avtale.

INSTALLERT UTSTYR

Produkt	Type	Antall	Merknad
Befukter	Hyline HY05 Comfort	1	

BESKRIVELSE

Arbeidsoperasjon	Inkludert	Merknad
Visuell kontroll av elektriske og mekaniske forb.	☑	
Tjerne avleiringer fra dampsylinder, avlop	☑	
rengjoring av dampsylinder	☑	
Kontroll, rengjoring av elektroder	☑	
kontroll, rengjoring av avslammingspumpe	☑	
Kontroll, rengjorinh av innlopsmagnetventil	☑	
ntroll Kabeltilkoblinger	☑	
Fungsjonskontroll	☑	

MATERIELL SOM ER INKLUDERT I AVTALEN

Produkt	Type	Antall	Merknad

Side 1 av 1

6. Pressurized Air (ORAS)

The two compressors (fyrrom) are looked by Driften, so we do not need to do anything there.
The oil and particle filter above the emergency doors in room 268 has an indicator - so that one should be checked regularly, and the filter replaced when required.
A regular check of the pressure may be advantageous as well (just check inlet pressure of nitrogen generator for example)

7. Nitrogen 5.0(INMATEC/ORAS)

The World of Gases

5. Maintenance

5.1. General Information

In order to prevent damage to the generator or perilous injuries during maintenance of the nitrogen generators, the following points are obligatory to be observed:

- All job steps for maintenance of the generators must imperatively be done in the specified order.
- At first secure a wide area around the generator to carry out maintenance work.
- Switch off all the voltage sources and secure the voltage sources against unintentional switch-on.
- Switch the pressure units to depressurized mode.
- Use only operating materials as specified.
- Use only INMATEC-spare parts, which are itemized in our spare parts list. (In case that not original INMATEC spare parts are used, the warranty is null and void)
- All maintenance operations are to be documented according to following maintenance plan.

INMATEC GaseTechnologie GmbH & Co. KG, Gewerbestr. 72, 82211 Herrsching a. A.
Fon +49(0)8152 9097-0, Fax +49(0)8152 9097-10, Email info@inmatec.de

Figure 4: Maintenance of the nitrogen generators.

5.2 Maintenance Instruction

In order to ensure correct operation, it is necessary that maintenance for the INMATEC nitrogen generator is carried out in accordance to maintenance plan resp. maintenance instructions of the manufacturer.

Daily	Check of drainage on entire filtration system Inspection of floating deflectors for correct function
Weekly	Visual check of entire generator Examination of compressed air processing Examination of compressed air quality Inlet temperature of compressed air to be max. + 40 °C.
Monthly	Check of analyser unit (if existing)
At the latest every 2000 operating hours or 1x per year, whichever comes first	Replacement of Industry filter elements
Yearly resp. every 4.000 operating hours during maintenance by IMT- service engineer	Visual check of entire generator Measuring N_2-purity, pressure dew point and pressure Inspection of gas connections for leak-tightness Inspection of N_2-outlets for discharge flow Inspection of pneumatic switch- and control elements Control of entire electrical system for function Inspection of electrical connections Inspection of float conductor for function Inspection of condensate outlet device for tightness Adjusting of inlet pressure control Inspection and adjustment of gas setting valves Measuring of inlet- and outlet pressure on the generator Replacement of sensor for gas analyser unit Calibration of air inlet flow and of nitrogen Testing and calibration of N_2-purity Testing and adjusting of N_2-supply Functional test of nitrogen generator
At the latest every 4.000 operating hours	Demounting and visual check of valves, lubricate and replacement of valve inserts if applicable
At the latest every 24.000 operating hours	Replacement of valves

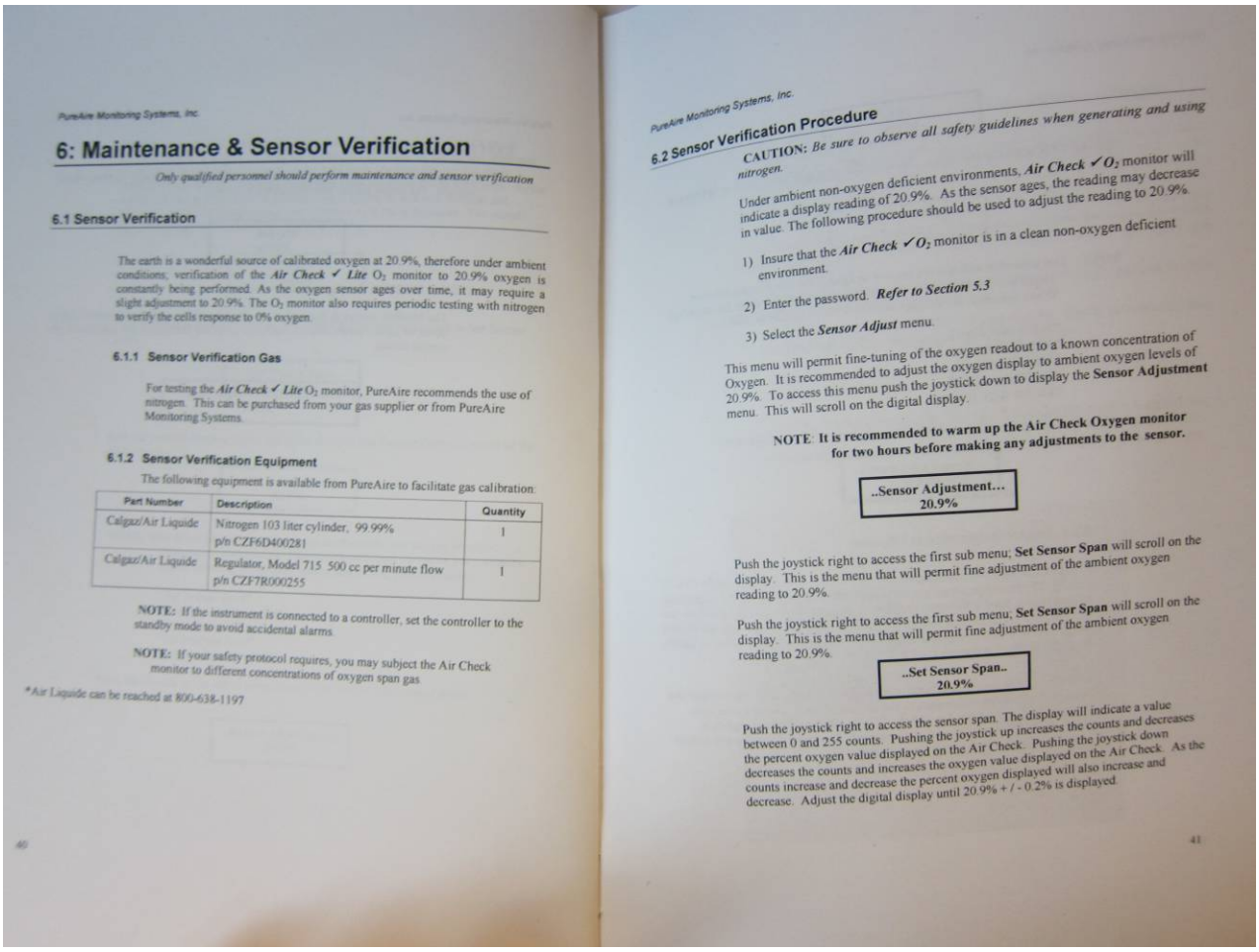
Please consider:

The effectively required intervals for inspection, maintenance, replacement of filters etc. may be shorter than mentioned. This is subject to the ambient conditions where the generator is operated and shall be agreed on site, if required, between the operator and our service engineer.

INMATEC GaseTechnologie GmbH & Co. KG, Gewerbestr. 72, 82211 Herrsching a. A.
Fon +49(0)8152 9097-0, Fax +49(0)8152 9097-10, Email info@inmatec.de

Figure 5: Maintenance Instructions.

8. Oxygen Deficiency Monitors (Prestegård/PureAire)



PureAire Monitoring Systems, Inc.

6: Maintenance & Sensor Verification

Only qualified personnel should perform maintenance and sensor verification

6.1 Sensor Verification

The earth is a wonderful source of calibrated oxygen at 20.9%, therefore under ambient conditions, verification of the ***Air Check ✓ Lite*** O_2 monitor to 20.9% oxygen is constantly being performed. As the oxygen sensor ages over time, it may require a slight adjustment to 20.9%. The O_2 monitor also requires periodic testing with nitrogen to verify the cells response to 0% oxygen.

6.1.1 Sensor Verification Gas

For testing the ***Air Check ✓ Lite*** O_2 monitor, PureAire recommends the use of nitrogen. This can be purchased from your gas supplier or from PureAire Monitoring Systems.

6.1.2 Sensor Verification Equipment

The following equipment is available from PureAire to facilitate gas calibration:

Part Number	Description	Quantity
Calgaz/Air Liquide	Nitrogen 103 liter cylinder, 99.99% p/n CZF6D400281	1
Calgaz/Air Liquide	Regulator, Model 715 500 cc per minute flow p/n CZF7R000255	1

NOTE: If the instrument is connected to a controller, set the controller to the standby mode to avoid accidental alarms.

NOTE: If your safety protocol requires, you may subject the Air Check monitor to different concentrations of oxygen span gas.

*Air Liquide can be reached at 800-638-1197

6.2 Sensor Verification Procedure

CAUTION: *Be sure to observe all safety guidelines when generating and using nitrogen.*

Under ambient non-oxygen deficient environments, ***Air Check ✓O_2*** monitor will indicate a display reading of 20.9%. As the sensor ages, the reading may decrease in value. The following procedure should be used to adjust the reading to 20.9%.

1) Insure that the ***Air Check ✓O_2*** monitor is in a clean non-oxygen deficient environment.

2) Enter the password. ***Refer to Section 5.3***

3) Select the ***Sensor Adjust*** menu.

This menu will permit fine-tuning of the oxygen readout to a known concentration of Oxygen. It is recommended to adjust the oxygen display to ambient oxygen levels of 20.9%. To access this menu push the joystick down to display the **Sensor Adjustment** menu. This will scroll on the digital display.

NOTE: It is recommended to warm up the Air Check Oxygen monitor for two hours before making any adjustments to the sensor.

..Sensor Adjustment... 20.9%

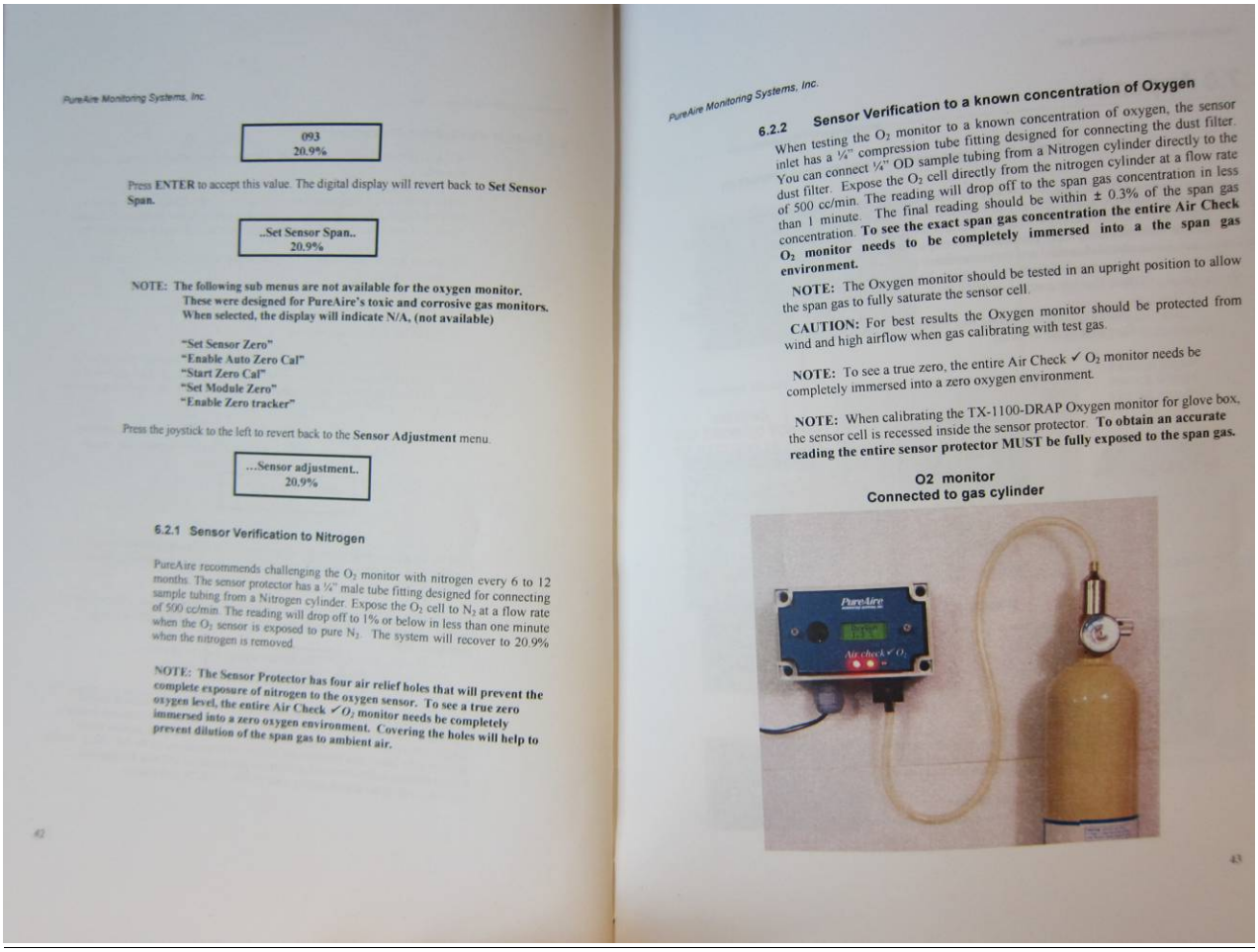
Push the joystick right to access the first sub menu; **Set Sensor Span** will scroll on the display. This is the menu that will permit fine adjustment of the ambient oxygen reading to 20.9%.

Push the joystick right to access the first sub menu; **Set Sensor Span** will scroll on the display. This is the menu that will permit fine adjustment of the ambient oxygen reading to 20.9%.

..Set Sensor Span.. 20.9%

Push the joystick right to access the sensor span. The display will indicate a value between 0 and 255 counts. Pushing the joystick up increases the counts and decreases the percent oxygen value displayed on the Air Check. Pushing the joystick down decreases the counts and increases the oxygen value displayed on the Air Check. As the counts increase and decrease the percent oxygen displayed will also increase and decrease. Adjust the digital display until 20.9% + / - 0.2% is displayed.

Figure 6: Maintenance and sensor verification of oxygen deficiency monitors.



PureAire Monitoring Systems, Inc.

093
20.9%

Press **ENTER** to accept this value. The digital display will revert back to **Set Sensor Span.**

..Set Sensor Span..
20.9%

NOTE: **The following sub menus are not available for the oxygen monitor. These were designed for PureAire's toxic and corrosive gas monitors. When selected, the display will indicate N/A, (not available)**

"Set Sensor Zero"
"Enable Auto Zero Cal"
"Start Zero Cal"
"Set Module Zero"
"Enable Zero tracker"

Press the joystick to the left to revert back to the **Sensor Adjustment** menu.

...Sensor adjustment..
20.9%

6.2.1 Sensor Verification to Nitrogen

PureAire recommends challenging the O_2 monitor with nitrogen every 6 to 12 months. The sensor protector has a ¼" male tube fitting designed for connecting sample tubing from a Nitrogen cylinder. Expose the O_2 cell to N_2 at a flow rate of 500 cc/min. The reading will drop off to 1% or below in less than one minute when the O_2 sensor is exposed to pure N_2. The system will recover to 20.9% when the nitrogen is removed.

NOTE: The Sensor Protector has four air relief holes that will prevent the complete exposure of nitrogen to the oxygen sensor. To see a true zero oxygen level, the entire Air Check ✓O_2 monitor needs be completely immersed into a zero oxygen environment. Covering the holes will help to prevent dilution of the span gas to ambient air.

42

PureAire Monitoring Systems, Inc.

6.2.2 Sensor Verification to a known concentration of Oxygen

When testing the O_2 monitor to a known concentration of oxygen, the sensor inlet has a ¼" compression tube fitting designed for connecting the dust filter. You can connect ¼" OD sample tubing from a Nitrogen cylinder directly to the dust filter. Expose the O_2 cell directly from the nitrogen cylinder at a flow rate of 500 cc/min. The reading will drop off to the span gas concentration in less than 1 minute. The final reading should be within ± 0.3% of the span gas concentration. **To see the exact span gas concentration the entire Air Check O_2 monitor needs to be completely immersed into a the span gas environment.**

NOTE: The Oxygen monitor should be tested in an upright position to allow the span gas to fully saturate the sensor cell.

CAUTION: For best results the Oxygen monitor should be protected from wind and high airflow when gas calibrating with test gas.

NOTE: To see a true zero, the entire Air Check ✓ O_2 monitor needs be completely immersed into a zero oxygen environment.

NOTE: When calibrating the TX-1100-DRAP Oxygen monitor for glove box, the sensor cell is recessed inside the sensor protector. **To obtain an accurate reading the entire sensor protector MUST be fully exposed to the span gas.**

O2 monitor
Connected to gas cylinder

43

Figure 7: Sensor verification to nitrogen and sensor verification to a known concentration of oxygen.

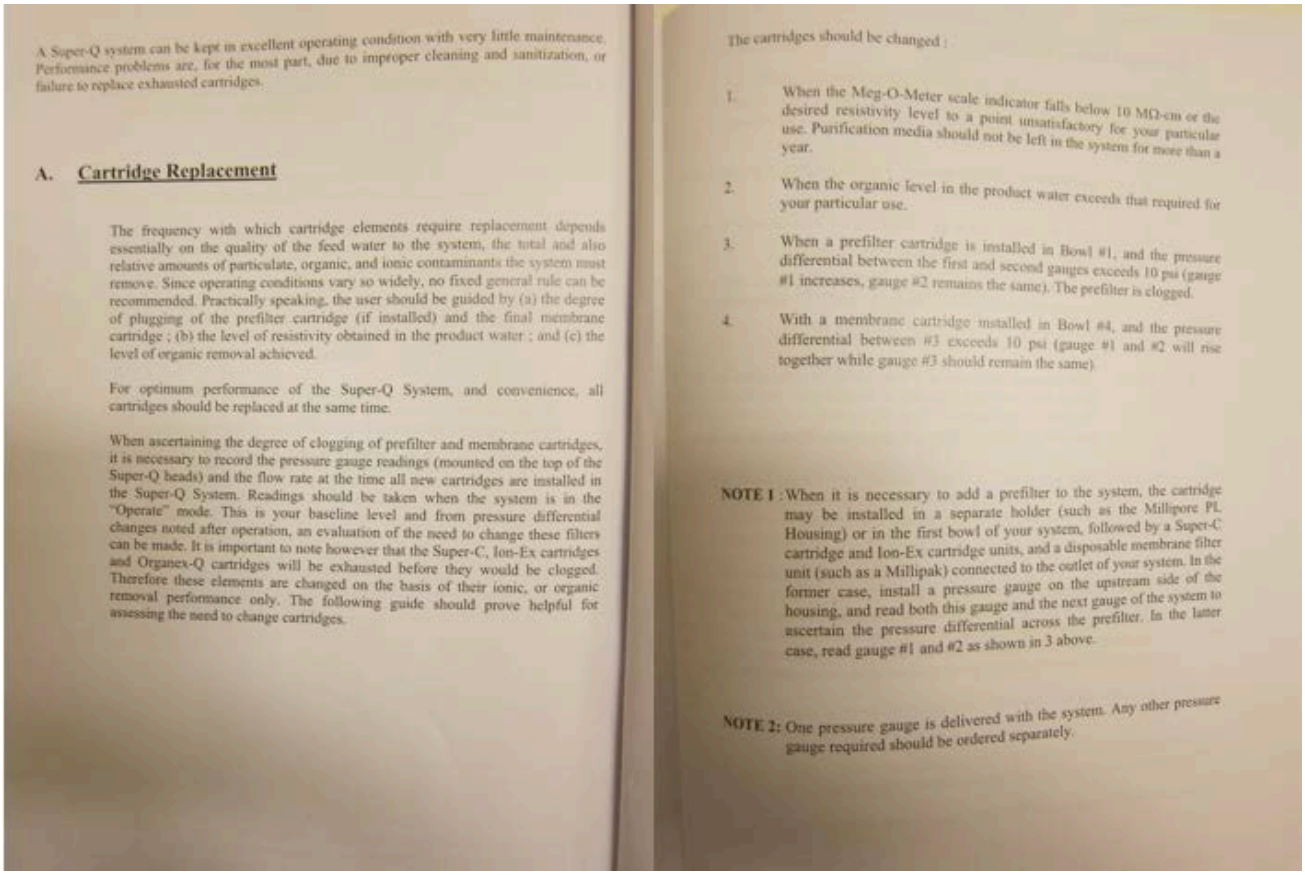
9. Process gas installation (YARAPRAXAIR)

Replace gas-bottles as required.

Check leakage after replacement by filling to full pressure, sealing the line and measure pressure drop during at least one hour.

10. De-ionized water (YIT/Millipore)

SuperQ 4306s (pretreatment)



A Super-Q system can be kept in excellent operating condition with very little maintenance. Performance problems are, for the most part, due to improper cleaning and sanitization, or failure to replace exhausted cartridges.

A. Cartridge Replacement

The frequency with which cartridge elements require replacement depends essentially on the quality of the feed water to the system, the total and also relative amounts of particulate, organic, and ionic contaminants the system must remove. Since operating conditions vary so widely, no fixed general rule can be recommended. Practically speaking, the user should be guided by (a) the degree of plugging of the prefilter cartridge (if installed) and the final membrane cartridge ; (b) the level of resistivity obtained in the product water ; and (c) the level of organic removal achieved.

For optimum performance of the Super-Q System, and convenience, all cartridges should be replaced at the same time.

When ascertaining the degree of clogging of prefilter and membrane cartridges, it is necessary to record the pressure gauge readings (mounted on the top of the Super-Q heads) and the flow rate at the time all new cartridges are installed in the Super-Q System. Readings should be taken when the system is in the "Operate" mode. This is your baseline level and from pressure differential changes noted after operation, an evaluation of the need to change these filters can be made. It is important to note however that the Super-C, Ion-Ex cartridges and Organex-Q cartridges will be exhausted before they would be clogged. Therefore these elements are changed on the basis of their ionic, or organic removal performance only. The following guide should prove helpful for assessing the need to change cartridges.

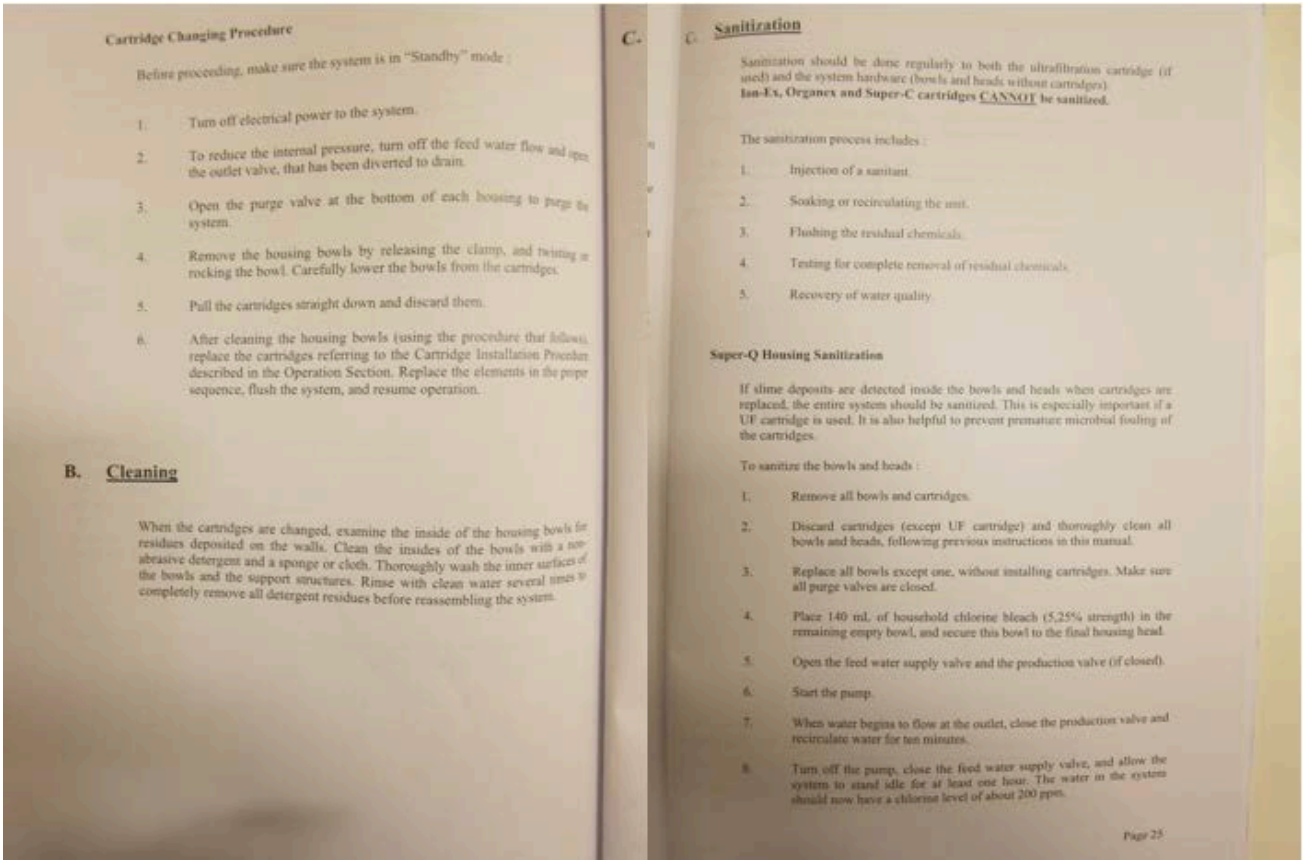
The cartridges should be changed :

1. When the Meg-O-Meter scale indicator falls below 10 MΩ-cm or the desired resistivity level to a point unsatisfactory for your particular use. Purification media should not be left in the system for more than a year.
2. When the organic level in the product water exceeds that required for your particular use.
3. When a prefilter cartridge is installed in Bowl #1, and the pressure differential between the first and second gauges exceeds 10 psi (gauge #1 increases, gauge #2 remains the same). The prefilter is clogged.
4. With a membrane cartridge installed in Bowl #4, and the pressure differential between #3 exceeds 10 psi (gauge #1 and #2 will rise together while gauge #3 should remain the same).

NOTE 1 : When it is necessary to add a prefilter to the system, the cartridge may be installed in a separate holder (such as the Millipore PL Housing) or in the first bowl of your system, followed by a Super-C cartridge and Ion-Ex cartridge units, and a disposable membrane filter unit (such as a Millipak) connected to the outlet of your system. In the former case, install a pressure gauge on the upstream side of the housing, and read both this gauge and the next gauge of the system to ascertain the pressure differential across the prefilter. In the latter case, read gauge #1 and #2 as shown in 3 above.

NOTE 2: One pressure gauge is delivered with the system. Any other pressure gauge required should be ordered separately.

Figure 8: Cartridge Replacement.



Cartridge Changing Procedure

Before proceeding, make sure the system is in "Standby" mode :

1. Turn off electrical power to the system.
2. To reduce the internal pressure, turn off the feed water flow and open the outlet valve, that has been diverted to drain.
3. Open the purge valve at the bottom of each housing to purge the system.
4. Remove the housing bowls by releasing the clamp, and twisting or rocking the bowl. Carefully lower the bowls from the cartridges.
5. Pull the cartridges straight down and discard them.
6. After cleaning the housing bowls (using the procedure that follows), replace the cartridges referring to the Cartridge Installation Procedure described in the Operation Section. Replace the elements in the proper sequence, flush the system, and resume operation.

B. Cleaning

When the cartridges are changed, examine the inside of the housing bowls for residues deposited on the walls. Clean the insides of the bowls with a non-abrasive detergent and a sponge or cloth. Thoroughly wash the inner surfaces of the bowls and the support structures. Rinse with clean water several times to completely remove all detergent residues before reassembling the system.

C.

C. Sanitization

Sanitization should be done regularly to both the ultrafiltration cartridge (if used) and the system hardware (bowls and heads without cartridges).
Ion-Ex, Organex and Super-C cartridges CANNOT be sanitized.

The sanitization process includes :

1. Injection of a sanitant.
2. Soaking or recirculating the unit.
3. Flushing the residual chemicals.
4. Testing for complete removal of residual chemicals.
5. Recovery of water quality.

Super-Q Housing Sanitization

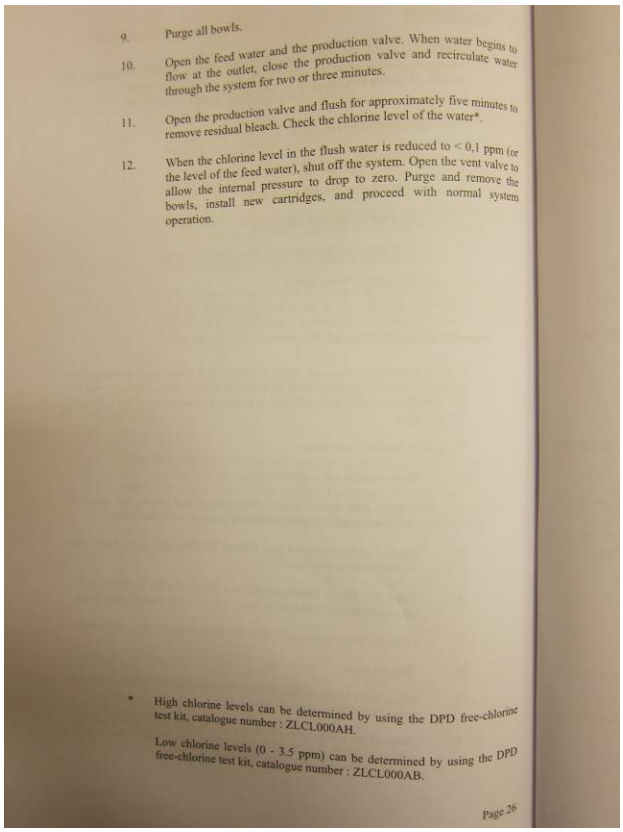
If slime deposits are detected inside the bowls and heads when cartridges are replaced, the entire system should be sanitized. This is especially important if a UF cartridge is used. It is also helpful to prevent premature microbial fouling of the cartridges.

To sanitize the bowls and heads :

1. Remove all bowls and cartridges.
2. Discard cartridges (except UF cartridge) and thoroughly clean all bowls and heads, following previous instructions in this manual.
3. Replace all bowls except one, without installing cartridges. Make sure all purge valves are closed.
4. Place 140 mL of household chlorine bleach (5,25% strength) in the remaining empty bowl, and secure this bowl to the final housing head.
5. Open the feed water supply valve and the production valve (if closed).
6. Start the pump.
7. When water begins to flow at the outlet, close the production valve and recirculate water for ten minutes.
8. Turn off the pump, close the feed water supply valve, and allow the system to stand idle for at least one hour. The water in the system should now have a chlorine level of about 200 ppm.

Page 25

Figure 9: Cartridge changing procedure, cleaning, and sterilisation.



9. Purge all bowls.
10. Open the feed water and the production valve. When water begins to flow at the outlet, close the production valve and recirculate water through the system for two or three minutes.
11. Open the production valve and flush for approximately five minutes to remove residual bleach. Check the chlorine level of the water*.
12. When the chlorine level in the flush water is reduced to < 0,1 ppm (or the level of the feed water), shut off the system. Open the vent valve to allow the internal pressure to drop to zero. Purge and remove the bowls, install new cartridges, and proceed with normal system operation.

* High chlorine levels can be determined by using the DPD free-chlorine test kit, catalogue number : ZLCL000AH.

Low chlorine levels (0 - 3,5 ppm) can be determined by using the DPD free-chlorine test kit, catalogue number : ZLCL000AB.

Page 26

Figure 10: Cartridge sterilisation.

Chapter 4 MAINTENANCE

4-1 SCHEDULED MAINTENANCE TABLE

See the Maintenance Table below for the typical maintenance that needs to be performed on your RiOs System. The catalogue numbers and other ordering information are found in Section 6-1. Detailed information about the various consumable items can be found in Section 2-5.

Item or action	Maintenance Needed	When?	How to?
Clean RO Cartridges	Cleaning.	As necessary.	See Section 4-6.
Other Pretreatment	See Pretreatment Device Owner's Manual for this information.	See Pretreatment Device User Manual for this information.	See Pretreatment Device User Manual for this information.
PrePak L1 Pre-System Pretreatment Pack	Replacement.	Change when Progard TL1 or TL2 Pack is changed.	See information that came with the Pack.
Progard TL1 or TL2 System Pretreatment Pack	Replacement.	When prompted to by an LCD Message.	See Section 4-2.
QGard TL Polisher Pack	Replacement.	When prompted to by an LCD Message.	See Section 4-7.
RO Pump Pressure	Adjustment.	Water temp. < 25 °C, operate at 10 bar. Water temp. ≥ 25 °C, operate at 7 bar.	Contact Millipore. See Section 4-4.
Sanitise RO Cartridges	Sanitisation.	Automatically when the Progard TL1 or TL2 Pack is changed or as needed.	See Section 4-5.
UV Lamp	Replacement.	When prompted to by an LCD Message.	See Section 4-3.

Figure 11: Maintenance table for a RIOs System: RIOS200 ZROS 50 200.

Chapter 4 MAINTENANCE AND ALARMS

4-1 MAINTENANCE

MAINTENANCE SCHEDULE

What?	When?
Replace Vent Filter (to be ordered separately)	At the same time than the Progard Pak.
Fill the overflow with acid + pH indicator	When the level of acid drops.
Sanitization of reservoir	Contact Millipore for an adapted sanitization protocol.

SANITARY OVERFLOW DEVICE

The SDS Overflow Device should be filled with water plus a germicidal agent. This prevents bacteria from growing in the Overflow Device. One way to do this is to fill up the Overflow Device with an acidic solution. The instructions below provide information on how to do this.

1. Make a Sulphuric Acid solution of pH 2 (equivalent to Normality 0.01 N). Add some pH indicator so a colour change can be seen if the pH rises to a value such as 4. This will indicate that it is time to renew the acidic solution in the Overflow Device. An indicator such as Methyl Orange can be used.
2. Locate the overflow device. Locate the red plug near the top of the Overflow Device.
3. Remove the red plug.
4. Inject some of the acidic solution into the Overflow Device. Replace the red plug

Acidic solutions can be dangerous if spilled on your skin or if it gets into your eyes. Wear eye protection and wear gloves and other appropriate safety equipment while handling acid

SANITIZATION OF RESERVOIR

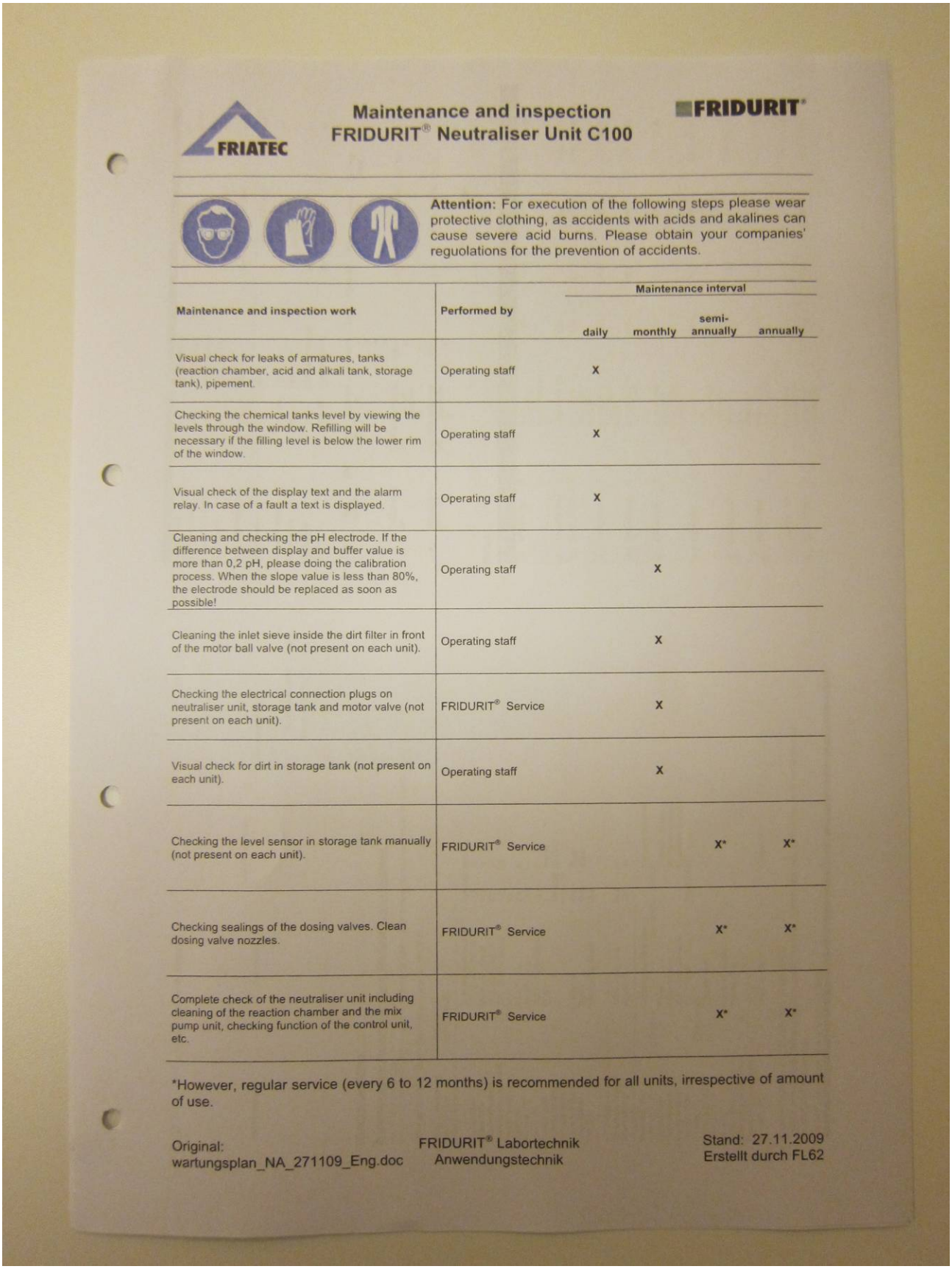
Contact Millipore for an adapted sanitization protocol.

4-2 TROUBLESHOOTING GUIDE

All the displayed messages for the Maintenance and Alarms are described in the Water System User Manual.

Figure 12: Maintenance and alarms SDS 350 tank + pump.

11. Waste-water neutralization (YIT/FRIATEC)



FRIATEC

Maintenance and inspection
FRIDURIT® Neutraliser Unit C100

FRIDURIT®

Attention: For execution of the following steps please wear protective clothing, as accidents with acids and akalines can cause severe acid burns. Please obtain your companies' reguolations for the prevention of accidents.

Maintenance and inspection work	Performed by	Maintenance interval			
		daily	monthly	semi-annually	annually
Visual check for leaks of armatures, tanks (reaction chamber, acid and alkali tank, storage tank), pipement.	Operating staff	X			
Checking the chemical tanks level by viewing the levels through the window. Refilling will be necessary if the filling level is below the lower rim of the window.	Operating staff	X			
Visual check of the display text and the alarm relay. In case of a fault a text is displayed.	Operating staff	X			
Cleaning and checking the pH electrode. If the difference between display and buffer value is more than 0,2 pH, please doing the calibration process. When the slope value is less than 80%, the electrode should be replaced as soon as possible!	Operating staff		X		
Cleaning the inlet sieve inside the dirt filter in front of the motor ball valve (not present on each unit).	Operating staff		X		
Checking the electrical connection plugs on neutraliser unit, storage tank and motor valve (not present on each unit).	FRIDURIT® Service		X		
Visual check for dirt in storage tank (not present on each unit).	Operating staff		X		
Checking the level sensor in storage tank manually (not present on each unit).	FRIDURIT® Service			X*	X*
Checking sealings of the dosing valves. Clean dosing valve nozzles.	FRIDURIT® Service			X*	X*
Complete check of the neutraliser unit including cleaning of the reaction chamber and the mix pump unit, checking function of the control unit, etc.	FRIDURIT® Service			X*	X*

*However, regular service (every 6 to 12 months) is recommended for all units, irrespective of amount of use.

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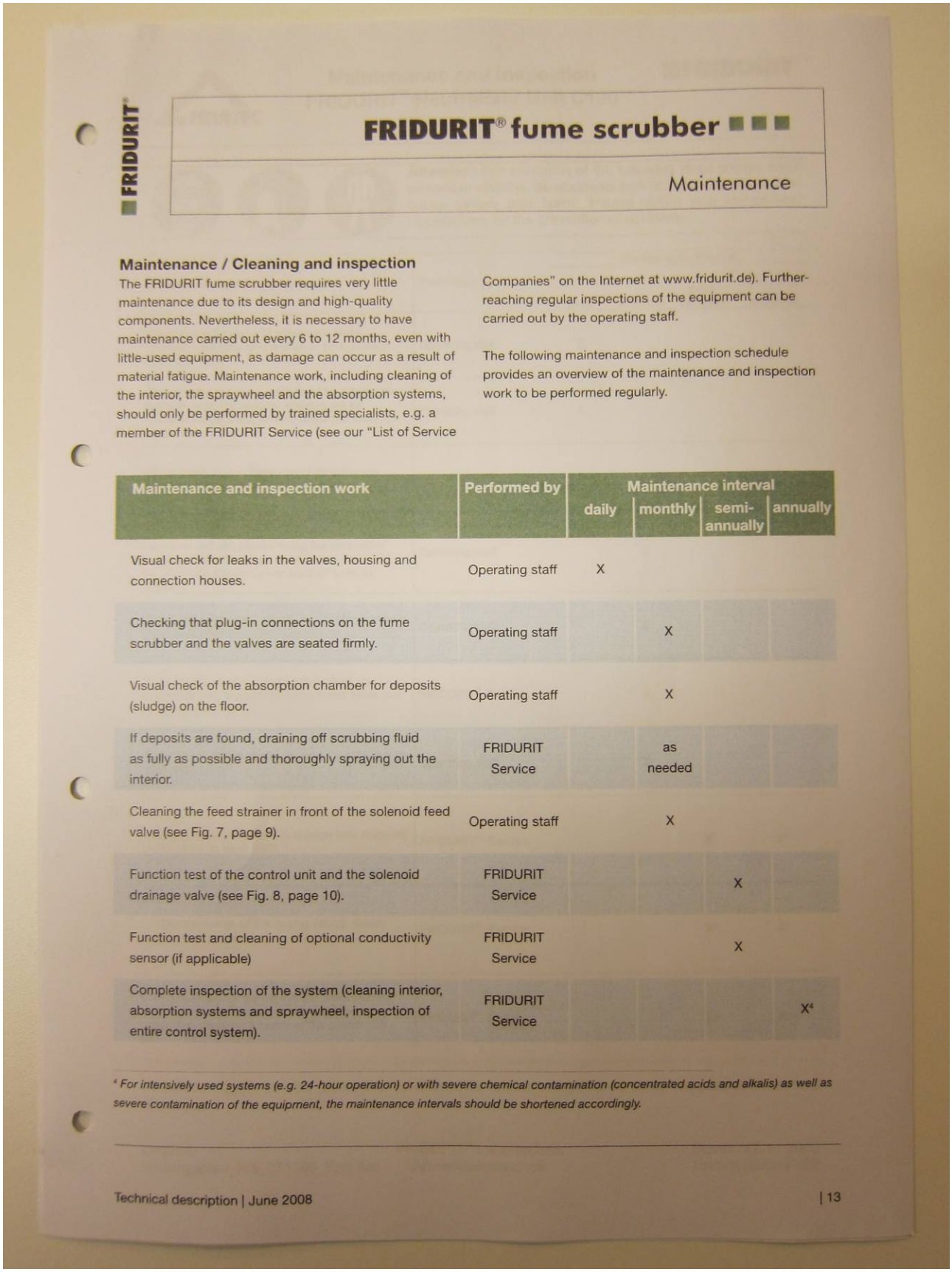
FRIDURIT® Labortechnik Anwendungstechnik

Stand: 27.11.2009
Erstellt durch FL62

Figure 13: Maintenance and inspection FRIDURIT Neutraliser Unit C100.

12. Exhaust air Scrubber (YIT/FRIATEC)



FRIDURIT

FRIDURIT® fume scrubber

Maintenance

Maintenance / Cleaning and inspection

The FRIDURIT fume scrubber requires very little maintenance due to its design and high-quality components. Nevertheless, it is necessary to have maintenance carried out every 6 to 12 months, even with little-used equipment, as damage can occur as a result of material fatigue. Maintenance work, including cleaning of the interior, the spraywheel and the absorption systems, should only be performed by trained specialists, e.g. a member of the FRIDURIT Service (see our "List of Service Companies" on the Internet at www.fridurit.de). Further-reaching regular inspections of the equipment can be carried out by the operating staff.

The following maintenance and inspection schedule provides an overview of the maintenance and inspection work to be performed regularly.

Maintenance and inspection work	Performed by	Maintenance interval			
		daily	monthly	semi-annually	annually
Visual check for leaks in the valves, housing and connection houses.	Operating staff	X			
Checking that plug-in connections on the fume scrubber and the valves are seated firmly.	Operating staff		X		
Visual check of the absorption chamber for deposits (sludge) on the floor.	Operating staff		X		
If deposits are found, draining off scrubbing fluid as fully as possible and thoroughly spraying out the interior.	FRIDURIT Service		as needed		
Cleaning the feed strainer in front of the solenoid feed valve (see Fig. 7, page 9).	Operating staff		X		
Function test of the control unit and the solenoid drainage valve (see Fig. 8, page 10).	FRIDURIT Service			X	
Function test and cleaning of optional conductivity sensor (if applicable)	FRIDURIT Service			X	
Complete inspection of the system (cleaning interior, absorption systems and spraywheel, inspection of entire control system).	FRIDURIT Service				X[4]

[4] *For intensively used systems (e.g. 24-hour operation) or with severe chemical contamination (concentrated acids and alkalis) as well as severe contamination of the equipment, the maintenance intervals should be shortened accordingly.*

Technical description | June 2008 | 13

Figure 14: Maintenance and cleaning: Fridurit fume scrubber.

13. E-Line Temperature-stabilized Cleanroom cabin (MCRT)

For adjustments at the CACU - type clean air conditioning see separate manuals

6 Maintenance

The EASY-LINE-SYSTEM CAMS is designed for continuous operation.

Regularly check electrical connection, state of air inlet protection grid, etc. for safety.

MCRT GmbH is not liable for improper installation and resulting consequences from it.

Only use spare parts authorised or recommended by MCRT GmbH. Other parts or modifications not arranged with MCRT GmbH will endanger operation and safety of the CAMS.

Before working inside the CAMS it has to be switched off and the connection cable has to be removed.

Working at the electrical components may only be done by qualified persons according to electro technical and safety rules.

The CAMS may operated opened only by qualified staff which are pointed to the risks and only to locate and repair malfunctions.

There is danger to life by electrical voltage and risk of injury by rotating parts.

Before removing the ULPA filter wait until the fans have stopped.

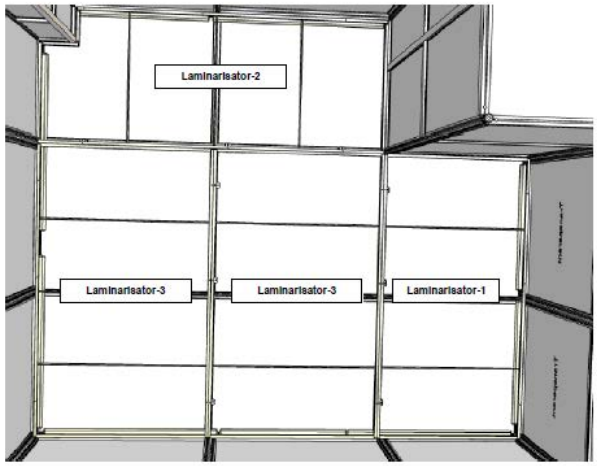
6.1 Cleaning

The outside of the CAMS should be cleaned regularly by vacuum cleaner or with a soft wiper and isopropyl alcohol. To prevent from electrostatic charge add some DI water.

To clean the mono filament gauze remove it from the CAMS and vacuum it from both sides with low vacuum with a clean and smooth nozzle. Or blow it from the outer side with clean air and low pressure.

6.2 Removing the laminarisator (Gauze Frames)

There are 4 gauze frames inside the cabin for the air outlet.
To remove the gauze frames unlock the 6 screws mounted at the gauze frame profiles. Then you can pull out very carefully the gauze frames.



!!! Be careful !!!
Do not damage the gauze.

Picture 3: Inside the cabin with the Flexi-Clean-Tower front wall

6.3 Changing the particle-Filter

First switch off the CAMS and remove, id possible the connection cable of the the filter-fan-unit.
After removing the filter there is danger by touching parts conducting electrical voltage.

When operating the CAMS without the filter there is risk of injuries by rotating parts !

Wait until the fans have stopped before removing the filter !

Installation should preferably take place with 2 persons

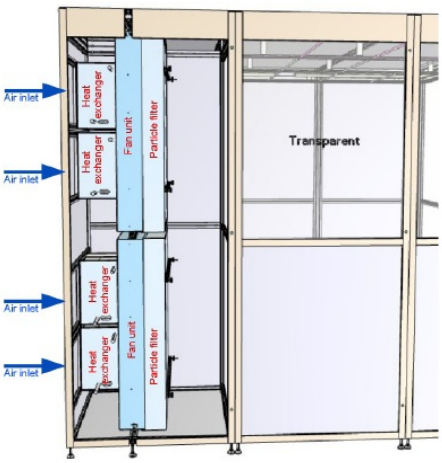
Steps:

1. Remove the "Flexi-Clean-Tower front wall" (see picture below). Use the handles of the wall for carefully removing.
2. Remove the 2 horizontal filter holders at each particle filter.

Attention !!! Use gloves and pay attention to the proper insertion.

3. Lift up and pull out the filter very carefully because of the sensitive biomed gel in the nut
4. Insert new filter and do steps above in reverse order.

Picture 4: Particle filters with the holders



Attention !!! Use gloves and pay attention to the proper insertion (direction of air flow is marked on the filter).

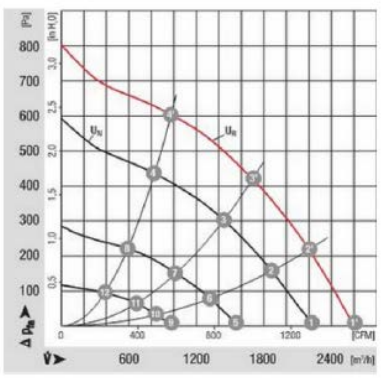
Be **careful** when **unpacking and handling the filter**:
the bottom of the filter consists of a **delicate material**
1. **Do not pressure on it!**
2. **Do not touch with pointed or sharp parts!**
Risk of damaging!

7 Characteristic for a EC-centrifugal fan Type R3G310-AN

It is recommended to change the fans after 50.000 operating hours preventative.

Nominal data		Voltage	Voltage range VDC	Air flow	Speed	Power consumption	Current draw	Sound pressure level	Operative range	Weight
Type	Motor	VDC	VDC	m³/h	1/min	W	A	dB(A)	Pa	kg
R3G310AN1230	M3G084FA	48	36 - 57	2230	2000	190	4.00	71	0 .. 800	4.2

Characteristic: Pressure over air flow	n [1/min]	P_1 [W]	I [A]	LpA [dBA]	ntL [%]
1	2395	271	--	74	--
2	2345	325	--	71	47
3	2320	362	--	70	60
4	2330	350	--	74	54
1	2070	178	--	71	--
2	2035	211	--	67	47
3	2015	234	--	65	60
4	2025	227	--	70	54
5	1445	66	--	61	--
6	1430	79	--	59	47
7	1420	88	--	57	60
8	1420	85	--	62	54
9	930	23	--	50	--
10	925	26	--	48	47
11	920	29	--	47	60
12	920	28	--	51	54



14. ISO-5 cleanroom cabin (MCRT)

A filter fan unit of the overall system is representative of all in order to filter pollution separately monitored using differential pressure cell. The initial pressure drop in pollution-filter is 125 Pa, '. The differential pressure can be adjusted so that these at a pressure difference of 250 Pa and responds with a warning message to the contact, the controller further reports. This then brings it to the police.

6 Maintenance

The EASY-LINE-SYSTEM CAMS is designed for continuous operation.

Regularly check electrical connection, state of air inlet protection grid, etc. for safety.

MCRT GmbH is not liable for improper installation and resulting consequences from it.

Only use spare parts authorised or recommended by MCRT GmbH. Other parts or modifications not arranged with MCRT GmbH will endanger operation and safety of the CAMS.

Before working inside the CAMS it has to be switched off and the connection cable has to be removed.

Working at the electrical components may only be done by qualified persons according to electro technical and safety rules.

The CAMS may operated opened only by qualified staff which are pointed to the risks and only to locate and repair malfunctions.

There is danger to life by electrical voltage and risk of injury by rotating parts.

Before removing the ULPA filter wait until the fans have stopped.

6.1 Cleaning

The outside of the Cleanroom should be cleaned regularly by vacuum cleaner or with a soft wiper and isopropyl alcohol. To prevent from electrostatic charge add some DI water.

Access to the FFU is it possible by some loose tiles lying! Or take out through the HEPA filter from the RSC-frame and remove the fan cover plate

6.2 Changing the Prefilter

The pre-filter can be easily removed and thus changing between.
Depending on the degree of ambient air changing the prefilter in cycles of 2 to 8 weeks is recommended.

6.3 Changing the particle-Filter

First switch off the Power of the clean room and remove, if possible the connection cable of the the filter-fan-unit.
After removing the filter there is danger by touching parts conducting electrical voltage.

When operating the CAMS without the filter there is risk of injuries by rotating parts !

Wait until the fans have stopped before removing the filter !

Installation should preferably take place with 2 persons

Steps:

1. Filter the particle filter out of the RSC-frame (room side change-frame).But the support frame must be taken out. Basic structure of the RSC-frame with the filters see picture below.
2. Gently pull the particle filter with the sensitive biomed gel nut from the sword of the RSC-frame. Remove the 2 horizontal filter holders at each particle filter.

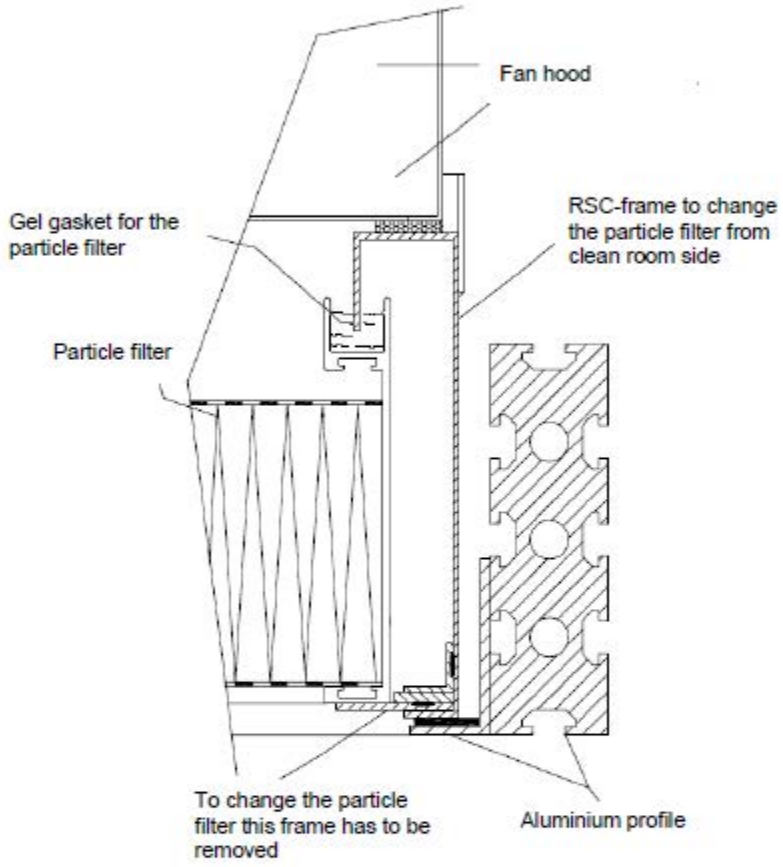
Attention !!! Use gloves and pay attention to the proper insertion.

3. Insert new filter and do steps above in reverse order.

Attention !!! Use gloves and pay attention to the proper insertion (direction of air flow is marked on the filter).

Be **careful** when **unpacking and handling the filter**:
the bottom of the filter consists of a **delicate material**

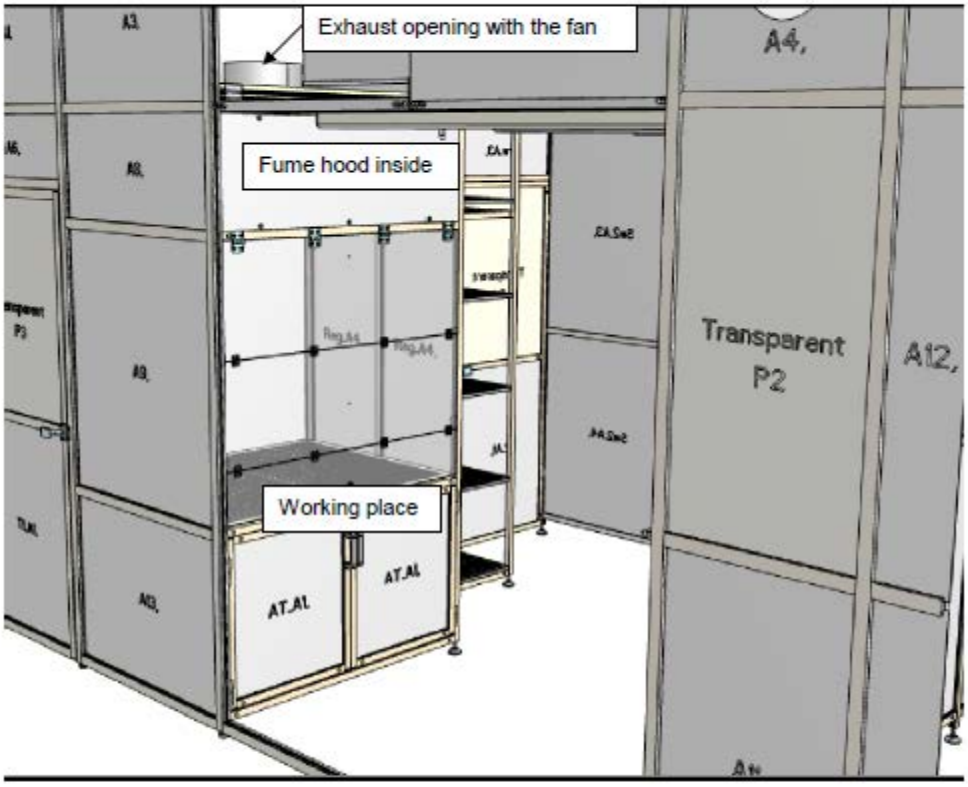
1. **Do not pressure on it!**
2. **Do not touch with pointed or sharp parts!**
   Risk of damaging!

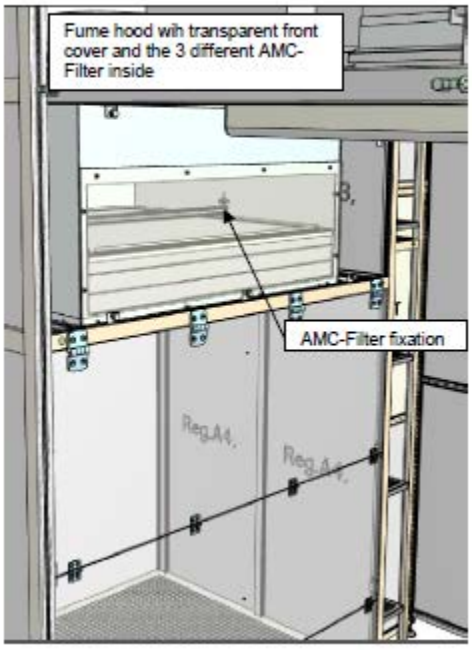


Picture 2: Principal drawing of the RSC-frame with the particle filter and the fan hood

6.4 Changing the AMC-Filter

On top of the working place there is a fume hood with 3 different chemical filters behind the front cover installed. See pictures below.





Steps:

1. first of all remove the front cover on top of the working place by opening the screws
2. Then remove the front cover of the fume hood by opening the screws. See picture above on the left.
3. Open the two AMC-filter fixation inside the fume hood and remove the filter fixation screws and frame. See picture above on the right.
4. Now you can change on of the 3 AMC-filter an and then do the steps above in reverse order.

6.5 Service life for Particle – and AMC-Filter in the integrated clean room cabin

6.5.1 Particle-Filter

There are HEPA-Filter in the filter fan units on top of the clean room cabin .

Filter typ: SSF-AAF-RSC-9/9/80/H14
Particle Filter H14; biomedgel-seal at air inlet, Size: 835x835x80 mm

Service life time
The Filter must be changed if the revolution speed of the Fans is bigger than 95% of the maximum speed, to have a air velocity at particle filter air outlet of 0,45 m/s. The revolution speed of the system is shown at the control-unit

6.5.2 AMC-Filter (Airborn molecular contamination –Filter)

AMC-Filter filters are designed for the gas-phase removal of atmospheric molecular contamination (AMC) from make-up air and recirculation systems to protect high-tech production processes in the semiconductor and related industries. AMC-filters are available as flat panels, containing chemical absorption material embedded in layers of synthetic support media. The material is impregnated to suit particular gas-phase contamination control applications.

Flat panel design for low to medium face velocities for applications in FFU´s and mini-environments.

There are 3 different AMC-Filter inside the fume hood on top of the working place inside the clean room cabin.

Filter typ: AMCF-HLST-MA-9/9/30
Absorbtion media typ MA is one layer, 25 mm of foam with catalytic carbon for removal of acid components. Carbon content approx. 3400 g/m2 each.
With an impregnation level of 20% phosphoric acid is 514 g H_3PO_4.
Therfor a layer has a capacity for NaOH of about 420 g.
Efficency of the filter is > 90% during the life time with an air velocity at the AMC-Filter of **0,45 m/s**
Chemical Filter, Size: 870 x 870 x 30 mm

Filter typ: AMCF-HLST-MB-9/9/30
Absorbtion media typ MB is one layer, 25 mm of foam with catalytic carbon for removal of bases components. Carbon content approx. 3400 g/m2 each.
With an impregnation level of 10% Potassium (potash) is 257 g K_2CO_3.
Therfor a layer has a capacity for HF of about 74 g.
Efficency of the filter is > 90% during the life time with an air velocity at the AMC-Filter of **0,45 m/s**
Chemical Filter, Size: 870 x 870 x 30 mm

Filter typ: AMCF-HLST-MP-9/9/30
Absorbtion media typ MP is one layer, 25 mm of foam with catalytic carbon for multipurpose adsorption capability. Carbon content approx. 2400 g/m2 each.
This amount of activated carbon is able to achieve at high levels of Kontaminiation, low temperature and low humidity of the air to a loading of about 40% of his own weight
Efficency of the filter is > 90% during the life time with an air velocity at the AMC-Filter of **0,45 m/s**
Chemical Filter, Size: 870 x 870 x 30 mm

15. Alarms

Test once a year.

16. Anti-static laboratory floor

Before work can be done in the lab that is sensitive to static electricity, all equipment to be used must be tested to comply with such work.

17. Storage for chemicals

Test fume extraction according to YIT or HMS requirements.

18. Emergency shower and eye-wash

Test shower and eye wash once a month or as required by HMS department or YIT.

Document History

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Version 0.2, Sept-2014, Author: Melanie Ostermann, Changes: in progress