Foam Trials, Raw Pictorial log (No editing) 4 May 2016

Trials were done in the chemical treatment plant Bat 676.

This was the second trial in this building.

Gantry and Digital spring balance (also the “Raspberry Pi” for DAQ)

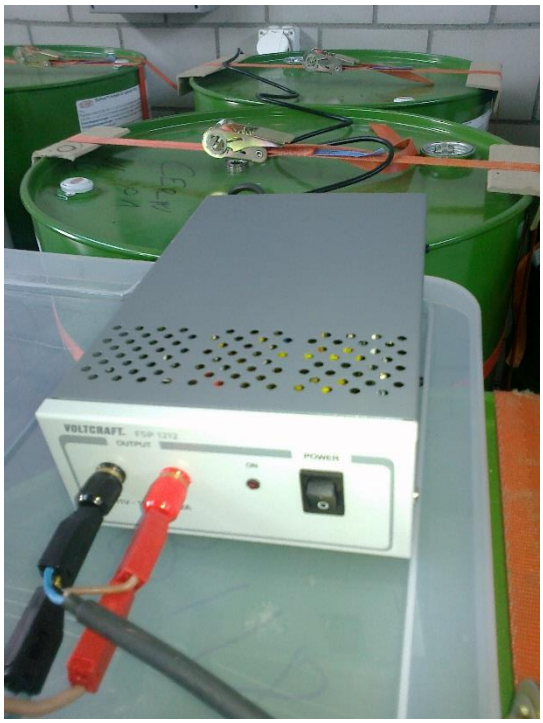
The digital spring Balance with readout

DAQ

Solution 2% (not observed) and pump

Nozzle , the biggest of the 3. Pressure were taken and recorded here unless otherwise stated. At the bottom of the picture is the controller for the fan speed. Shown at approx. 50%

Power Supply for the pump.



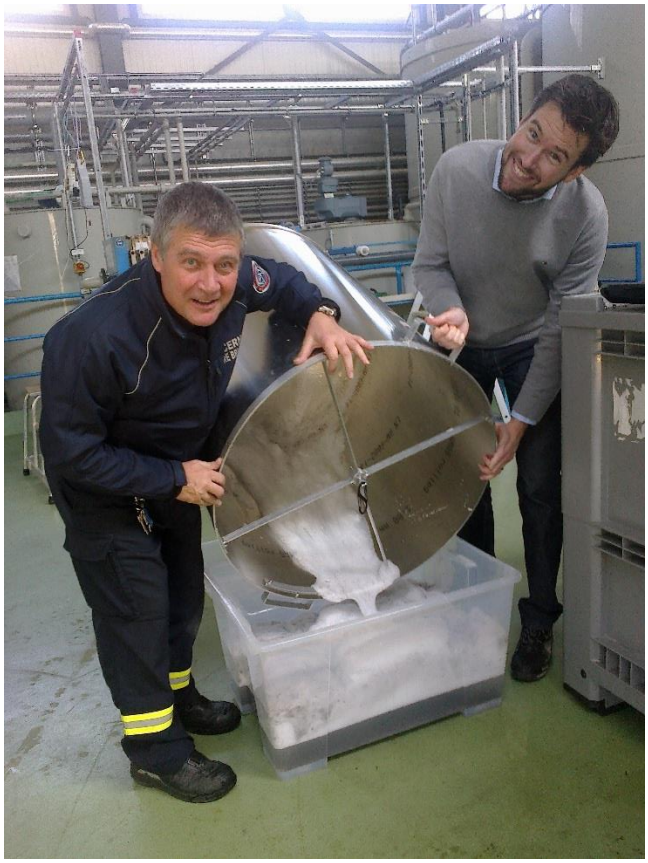
First attempt at filling cylindrical vessel. The tare was not taken. Need check list !

White decay products sitting on top of the foam

Destroying foam

Destroying Foam

Pouring out what was left



And rinsing

Residual foam after destruction using water spray.

Test # 2

The first effective test with useful DAQ. Start at 10.20am

Pressure at nozzle 1.2 – 1.3[Bar] (~2.6[bar] on the pump) temp measured in side building was 17[degC] but may be cooler with the doors open at both ends of the building. Temp taken with Fire Service IR imager.

Fan speed put back from 70% to 50%.

Initial weight was 117.55[N] AFTER filling off the gantry. The vessel was weighed in P5 at 11.4[kg] (Ian)

Quantity of liquid used was XXXXX [ml] (Grams !!)

Solution dropping out of the cylindrical vessel.

DAQ is running

Drainage is recorded , reading 116.70[N]

Still further reduction 110.25[N]

Decaying Foam with white deposit on top

Results test #2

Expansion ratio was 670 ? OR was it 670[ml] with solution of 2% (?)

Expansion ration = 480[litres]/0.67[litres] = 716.

Half time was 1303secs @ 3.65[N]

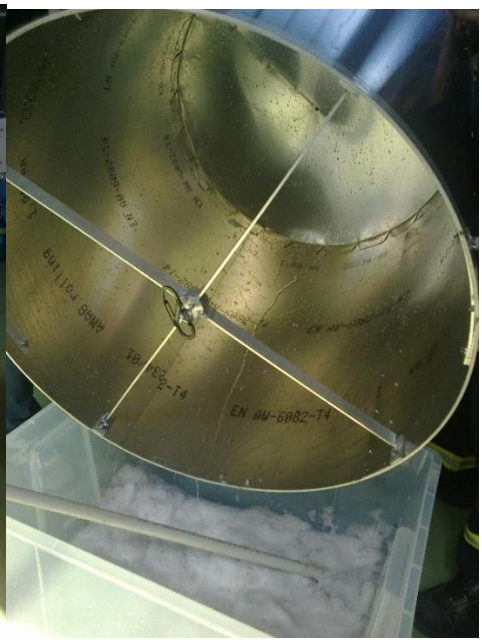
Half of half time (T/4) 2421s @ 1.85[N]

Stopped DAQ at 3829s @ 0.9(0.92)[N]

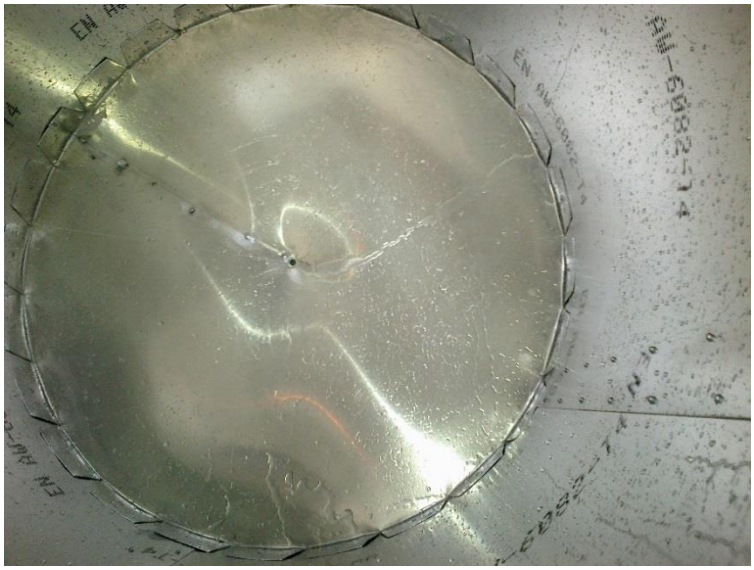
The foam level has not really changed. Down by 10cm.

Should we be measuring the solution falling from the vessel.

Removal and cleaning



All clean and time for coffe. At 1045 ?



Test #3

Filling the vessel this time starting on the gantry with DAQ running to obtain a real T0

Do not touch the vessel !

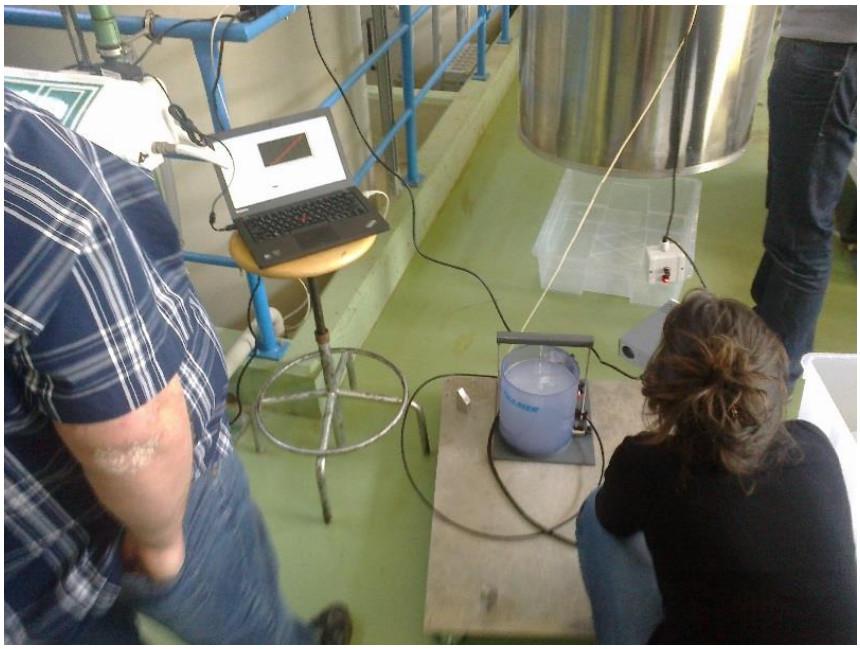
Start at 1138am

Temperature has increased. ? 1.15[bar] on Nozzle and 2.5[Bar] at the pump

Tare with residual water inside = 110.60[N]

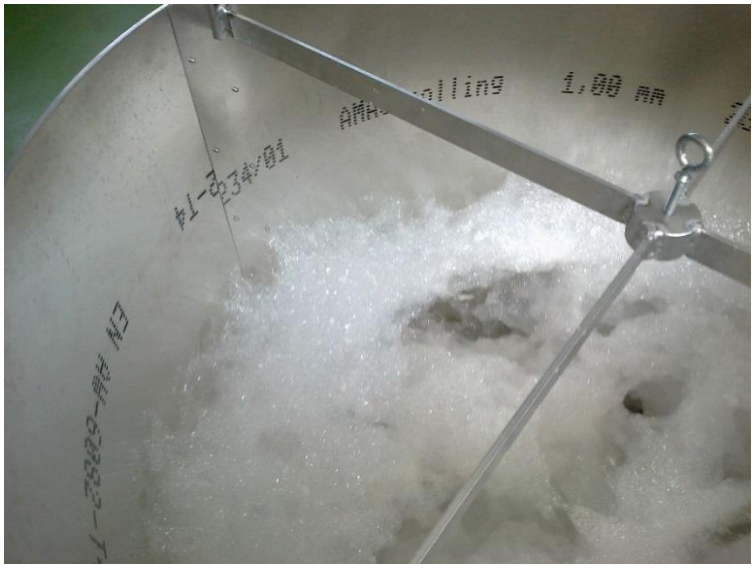
Solution used ; 2900 – 2200ml =700[ml]

Expansion ratio 480/0.7 = 685 with “weight” = 117.90[N]



Full, but perhaps not around the rear ….

Left over lunch. At 1353 the foam level is ~45cm down, there is no liquid left (110.25N). The remaining foam is readily destroyed.



Results for Test #3

	0s	7.4N	1138am
	1248s	3.7N	
	2399s	1.8N	1219pm
	3608s	0.93N	Foam 20cm down from top
	Lunch		
PC still running !		-0.35N	Foam down ~45cm @ 110.25N (1353pm)

Clean and draining

Residual water

Team Work

Who did we loose in there ?

Test #4

Start 1404pm

Remake solution

100[ml]ml of Sthamer FX15 and 5 litres of tap water from building supply (see auxillary photos for water quality.

Use 250ml flacon graduated to 10[ml].

Mixed into pump reservoir and 4950 – 4300ml = 650ml used for test

Expansion ratio 480[l]/0.65[l] = 739

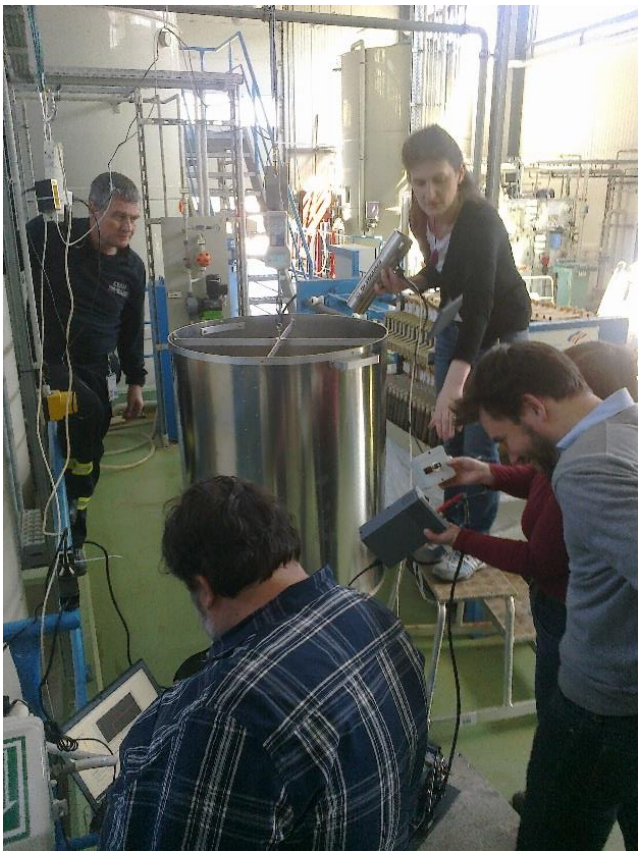
Tare = 110.20[N]

At 1408pm full with foam 116.20[N] = 5.95[N] “of foam”

Again filling with vessel suspended from gantry so obtaing a real T0.

Attempts were made to ensure complete filling, is the foam having sufficient structure to create voids and so full filling is not achieved ?

Fan speed check

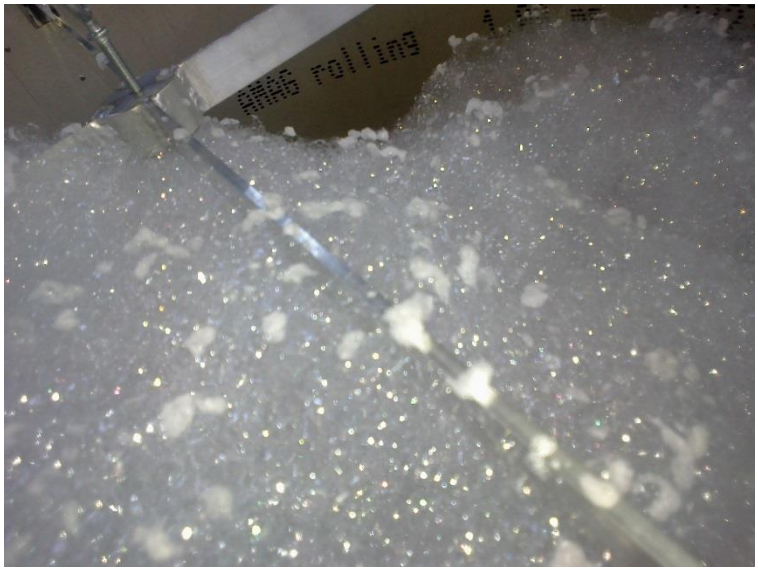


Filling check

A good jet at 50% fan speed, as for the other tests

It is really full this time. Do not touch !

Decaying Foam



Bubble size “printed” on alu sheet panel/cylinder. See many photos by Naomi.

Zoom of bubble “print”

Results of Test #4

0s	5.95[N]	xxxxpm
1567s	3.0[N]	1437pm
2992s	1.45[N]	1502pm
4997s	0.7[N]	1527pm

Temperature has increased but no measurement !

From the installation in the building;

Eau brute ph = 8.03 @ 25[degC]

Test #5

This time the method is changed to attempt to reproduce the earlier, morning results, by starting with the vessel on the ground and only when it is hung up on the gantry will the DAQ be started.

Start at 1535

Still less weight than in the morning.

0s	6.95[N]	1539pm
1514s	3.45[N]	xxxxpm
2835s	1.7[N]	xxxxpm
4172s	0.85[N]	1654pm (photo)

1556pm photos at 1075 secs Foam down.

114.45[N] @ 1170s

Video @ 2600s you can see the foam collapsing (see refs)

Temperature is recovering OR reducing, look at the bump in the plot (Zoltan)

Taking the tare BEFORE filling with foam ! 110.50[N]

Observer crew checking operator accuracy

Hung up and Full

117.25[N]

Test #6

Start at 1706pm

Quantity of solution was not well established. False start, people are becoming tired.

3600[ml] but on slope = 3650[ml]n – 2700[ml] = 950[ml] could be 10% error ??

Continue with previous method i.e. starting off the gantry/scale

Tare 110. Xxx[N]

6.85N 0s

Ian left around 1730 ? I requested Zoltan to take a few notes of essential points.

Record ends here.

Results are available here;

http://rpc-cms-re4-upscope.web.cern.ch/rpc-cms-re4-upscope/RPC/Safety/CMS%20Foam/Tests/Trials4May2016/Results4May2016.xlsx

This document is available here;

http://rpc-cms-re4-upscope.web.cern.ch/rpc-cms-re4-upscope/RPC/Safety/CMS%20Foam/Tests/Trials4May2016/FoamTrials4May2016.pdf

Alternative nozzles.

References;

3 video referenced here;

http://rpc-cms-re4-upscope.web.cern.ch/rpc-cms-re4-upscope/RPC/Safety/CMS%20Foam/Tests/PhotoTrials4May2016/Photos10April2016V2/

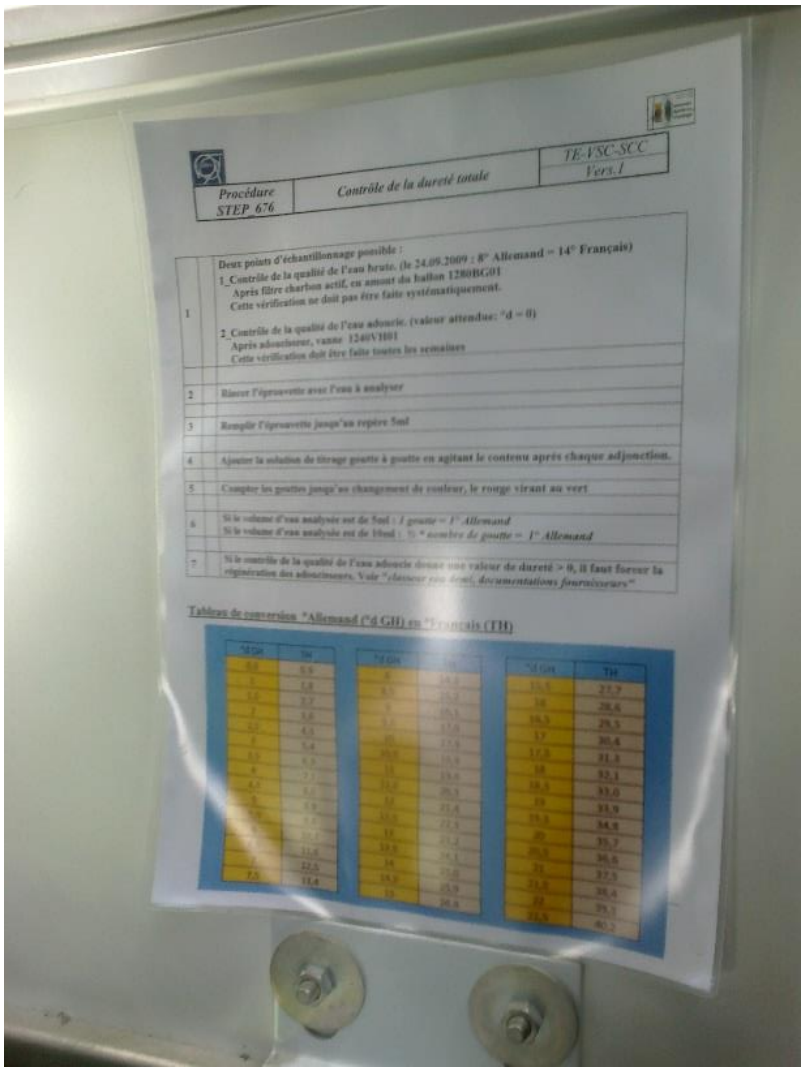
Files;

04052016.mp4, 04052016001.mp4 and 04052016002.mp4

One drop of water

50-60 micro grammes

Dimineralised water plant



Procédure STEP 676	Contrôle de la dureté totale	TE-VSC-SCC Vers.1

1	Deux points d'échantillonnage possible : 1_Contrôle de la qualité de l'eau brute. (le 24.09.2009 : 8° Allemand = 14° Français) Après filtre charbon actif, en amont du ballon 1280BG01 Cette vérification ne doit pas être faite systématiquement. 2_Contrôle de la qualité de l'eau adoucie. (valeur attendue: °d = 0) Après adoucisseur, vanne 1240VH01 Cette vérification doit être faite toutes les semaines
2	Rincer l'éprouvette avec l'eau à analyser
3	Remplir l'éprouvette jusqu'au repère 5ml
4	Ajouter la solution de titrage goutte à goutte en agitant le contenu après chaque adjonction.
5	Compter les gouttes jusqu'au changement de couleur, le rouge virant au vert
6	Si le volume d'eau analysée est de 5ml : *1 goutte = 1° Allemand* Si le volume d'eau analysée est de 10ml : *½ * nombre de goutte = 1° Allemand*
7	Si le contrôle de la qualité de l'eau adoucie donne une valeur de dureté > 0, il faut forcer la régénération des adoucisseurs. Voir *"classeur eau douce, documentations fournisseurs"*

Tableau de conversion °Allemand (°d GH) en °Français (TH)

°d GH	TH	°d GH	TH	°d GH	TH
0,0	0,0	8	14,3	15,5	27,7
0,5	0,9	8,5	15,2	16	28,6
1,0	1,8	9	16,1	16,5	29,5
1,5	2,7	9,5	17,0	17	30,4
2,0	3,6	10	17,9	17,5	31,3
2,5	4,5	10,5	18,8	18	32,1
3	5,4	11	19,6	18,5	33,0
3,5	6,3	11,5	20,5	19	33,9
4	7,1	12	21,4	19,5	34,8
4,5	8,0	12,5	22,3	20	35,7
5	8,9	13	23,2	20,5	36,6
5,5	9,8	13,5	24,1	21	37,5
6	10,7	14	25,0	21,5	38,4
6,5	11,6	14,5	25,9	22	39,3
7	12,5	15	26,8	22,5	40,2
7,5	13,4				

régénération des adoucisseurs. Voir "*classeur eau*

Tableau de conversion °Allemand (°d GH) en °Français (TH)

°d GH	TH
0,5	0,9
1	1,8
1,5	2,7
2	3,6
2,5	4,5
3	5,4
3,5	6,3
4	7,1
4,5	8,0
5	8,9
5,5	9,8
6	10,7
6,5	11,6
7	12,5
7,5	13,4

°d GH	TH
8	14,3
8,5	15,2
9	16,1
9,5	17,0
10	17,9
10,5	18,8
11	19,6
11,5	20,5
12	21,4
12,5	22,3
13	23,2
13,5	24,1
14	25,0
14,5	25,9
15	26,8

°d GH	TH
15,5	27,7
16	28,6
16,5	29,5
17	30,4
17,5	31,3
18	32,1
18,5	33,0
19	33,9
19,5	34,8
20	35,7
20,5	36,6
21	37,5
21,5	38,4
22	39,3
22,5	40,2


ph-Wert nach Enthärter
QICA±_0520MQ01
pH
8.03
25.0
PGM
EXIT
pH eau brute
entree production ED


Leitfähigkeit nach EDI
QSA1410MQ01
MΩ
xCm
PGM
EXIT
Conductivite EDI
<0.1 µS/cm ou >10 MΩ.cm


QSA1410MQ01
MΩ
xCm
PGM
EXIT
Conductivite EDI
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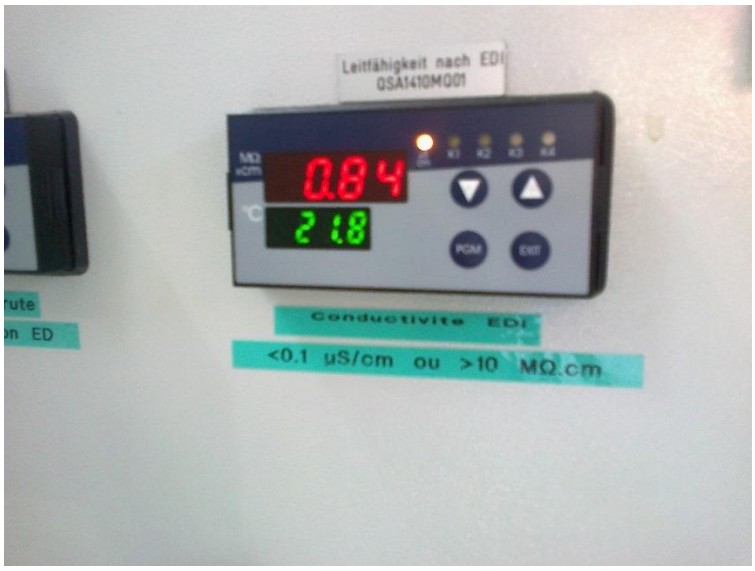

The general plant


ACIDE
CHROMIQUE
DIOXYDE
DE SOUFRE