Universitat Autònoma de Barcelona

TECHNICAL NOTE 87.2.2

CIII refurbishment detailed design

Prepared by/Préparé par	7+i Ingenieros Consultores
Reference/Réference	MELiSSA Pilot Plant Frame Contract 19445/05/NL/CP
Issue/Edition	0
Revision/Révision	0
Date of issue/Date d'édition	30/06/08
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APPROVAL

Title *Titre*	**CIII refurbishment detailed design**	Issue Edition	0	Revision Révision	0

Prepared by *Auteur*	7+i Ingenieros Consultores	Date *Date*	30/06/08

Checked by *Verifié par*	Peiro, E. and Fossen, A.	Date *Date*	15/07/08

Approved by *Approuvé par*	Gòdia, F.	Date *Date*	15/07/08

Approved by customer *Approuvé par le client*	Lamaze, B.	Date *Date*	01/07/08

CHANGE LOG

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Distribution List

Name/*Nom*	Company/*Société*	Quantity/*Quantité*
Brigitte LAMAZE	ESA	2 hardcopies + electronic version

TABLE OF CONTENT

1. FUNCTIONAL DESCRIPTION

EM Issue	DESCRIPTION	COMPIL	VERIF.	APPROV	DATE
0	Basic Engineering	FG	PGM		19.05.08

BRIEF FACILITIES DESCRIPTION

The unit are composed of:

Bioreactor: It is an up-flow co-current packed bed reactor type provided with:

- Sparger
- Magnetic coupling stirrer with variable speed
- Jacket to heat exchange with a closed loop water system
- Temperature control with a cascade between 2 controllers TIC-01 and TIC-04
- pH control through acid and base addition. pH controller commands 2 peristaltic pumps.
- An external closed loop of liquid recirculation through a diaphragm pump with variable speed and flow rate control FIC-02 (from top to down). This control loop is the secondary of a cascade with FIC-01
- A second external closed loop of liquid recirculation (called backwashing) through a second diaphragm pump with variable speed and flow rate control FIC-02 (from down to top) This control loop is the secondary of a cascade with FIC-01
- Inoculation system in recirculation line
- An external closed loop of gas with flow rate control FIC-07 and controlled addition of gasses: N2, O2 and CO2
- A continuous culture medium feeding with flow rate control FIC-01
- A continuous outlet of broth with a flow rate control FIC-06

Addition for pH control: It has been considered 2, acid and base, provided with

- Scale with weight transmitter to totalized the consume of reactive
- Peristaltic pump commanded by pH controller

Culture medium feeding: From a sterile vessel D-03 through a peristaltic pump P-04 commanded by flow rate control FICQ-01

Outlet broth: From the recirculation stream to a sterile vessel and controlled with the level control of reactor LIC-01. It has also flow rate measurement and totalizing FIQ-06.

Because all inputs to reactor must be sterilized before to put them inside, there are sterile filtration by cartridges in all streams

FUNCTIONAL DESCRIPTION

The whole of Compartment III working comprises 14 steps, which are described below.

STEP 1 – EMPTYING

(see scheme P1701-DR-002)
Before to start sterilization process, the facility should be emptied and coils drained, in order to avoid cold points.

Actions for it: Open reactor and vessels bottom valves and vent valves and also the reactor recirculation valve.

- Open V-153; V-141; V-144 for emptying D-03
- Open V-612; V-609; V-611 for emptying D-04
- Open V-501; V-411; V-315; V-320 and V-323 for emptying C-01

All coils will be drained opening simultaneously drains and vents of vessels, reactor and vent condenser.

- Open V-150; V-152 for emptying coil of D-03
- Open V-604; V-607 for emptying coil of D-04
- Open V-715; V-717 for emptying jacket of C-01
- Open V-311; V-312 for emptying coil of vent condenser E-01

STEP 2 – STERILIZATION 1

(see scheme P1701-DR-003)
The first step of sterilization consists in introducing steam through all the holes in order to move and displace air and condensed liquids from facilities.

For the reactor C-01:
Steam through V-103; V-123; V-157; V-331 and V-330; V-403; V-414; and V-205 (this one is the main steam entrance to reactor).
Air is moved through vents and drainages V-501 and V-323 and through both vent filters F-09/A and F-09/B
It has to be kept these conditions until temperature reaches 90ºC measured in TT-06

For the vessel D-03:
Steam through V-146
Air and condensed liquids are drained through V-153

For the vessel D-04:
Steam through V-602 and V-608
Air and condensed liquids are drained through V-612

The backup filters will be sterilized, one-to-one, during this step.

Filter housing vent valve will be hardly opened for few seconds to drain the air from the housing.

STEP 3 – STERILIZATION 2

(see scheme P1701-DR-004)
After to be reached 90ºC in TT-06, drainages are complete closed V-153; V-612 and V-501 and vents V-141; V-609 and V-323 nearly closed. The result is a pressure increase showed in PI-09; PI-13 and PI-17. At this moment, the steam entrance has to be regulated in order to keep it about 1,2barg, equivalent to 121ºC.

- Slightly close V-146 for the vessel D-03
- Slightly close V-602 for the vessel D-04
- Slightly close V-205 for the reactor C-01

STEP 4 – STERILIZATION 3

(see scheme P1701-DR-004)
Previous conditions have to be kept for 20 – 30 minutes to guarantee the correct sterilization of facilities.
It is not good to increase time or temperature of sterilization because it reduces the working life of equipment. In the case of hard contaminations (from spores, for instant) it is better to repeat (so many times as necessary) the described sterilization process every 24 hours with intermediate cooling down.

During this step, it is a good practice open and close some valves (not simultaneously) in order to allow steam flow through the internals of these valves, it so guaranteeing its complete sterilization.
These valves are: V-801; V-402; V-601 and V-413. We would advise to do this action alternatively for 15 seconds every 5 minutes.

STEP 5 – DRYING 1

(see scheme P1701-DR-005)
To guarantee the sterility of the air filters it has to be sure that cartridges will be completely dry. To do that, it proceeds to dry the facilities flowing compressed air opening V-204 and V-206, and draining through F-06/A opening V-327 and through F-09/A opening V-323.
Reactor bottom valve V-501 will be slightly opened to help to drain and to dry the reactor.
The length of this step will be: 5-10 minutes

STEP 6 – DRYING 2

(see scheme P1701-DR-006)
For same reasons it is necessary to dry backup filters.
Opening V-204 and V-206 and draining through F-06/B opening V-327 and through F-09/B opening V-323.
It is not necessary to keep draining the reactor, so V-501 it has to be closed.
The length of this step will be: 5-10 minutes

At the end of drying all the drainages and vents have to be closed. From this moment, the system has to be kept under a small overpressure with compressed air from V-202 after to regulate the line pressure at 0,1barg with the installed pressure reducer.

STEP 7 – COOLING

(see scheme P1701-DR-007)
Before the load of BYOSTYR® bed and the culture medium it has to be cooled down the facilities until temperature was near to working value.
It has to be flowed cold water through the vessel's jackets

- D-03, opening V-151 (set TIC-02 in AUTO with SP=5ºC)
- D-04, opening V-606 (set TIC-03 in AUTO with SP=5ºC)
- E-01, opening V-313

For the reactor, first of all it has to be filled the water closed system, opening V-711 (with PCV-04 regulating at 0,5barg) and draining the air through V-717. When the system is full its possible to start up the recirculation pump P-05, open the valves V-704 and V-702 and set temperature control loop TIC-04 in LOCL/AUTO/SP=28ºC

These control loops already can keep in AUTO for the rest of the process

STEP 8 – FILLING BED

(see scheme P1701-DR-008)
The bed must be inside an addition bag which has to be provided with the passive part of a buck-valve.
All of them have to be sterilized (by radiation, for instance) before to load the bed into reactor.
It is a good practice to impregnate both faces of buck-valve with a disinfectant solution, before to connect both parts of bulk-valve.

Open the valve of compressed air V-202 with the pressure reducer regulated at 1barg (to be adjusted in commissioning).

Drainage and vent valves V-501 and V-323 will be completely opened.
Buck-valve will be opened slowly for starting the transport of the bed to the reactor.

The transport can be stopped from time to time in order to allow the bed to place.
To achieve this objective, also helps to modify the opening of drainage and vent valves.

Finished the load of bed it has to be kept under a small overpressure with compressed air from V-202 after to regulate the line pressure at 0,1barg with the installed pressure reducer. The drainage and vent valves will be closed. In these conditions the buck-valve will be closed and disconnected.

STEP 9 – FILLING MEDIUM

(see scheme P1701-DR-009)
The actions to fill the vessel D-03 are:

- Open vent valve V-141
- Make sure drainage V-153 is closed
- Load is carried out with an auxiliary like a peristaltic pump, and through filter F-04 and V-145.
- Temperature control TIC-02 will be set in AUTO with SP=4ºC

Before to start the medium load to reactor it has to be opened the gas exit V-324 and will be set PIC-02 in AUTO with SP=1.000mbar. Also, it has to be opened the cooling of E-01.

The reactor is filled through V-154 and F-03. Start up P-04 and set FIC-01 in MAN 100% at the beginning of load, totalizer FICQ-01 will be reset.

Addition will be stopped when level was over the funnel of the reactor's exit pipe to allow the recirculation and inoculation. To do that, level LT-01 will be checked (and also through the upper spy-glass).

Temperature control loop TIC-04 will be set in REMOTE control and the primary TIC-01 set in AUTO with SP=28ºC

STEP 10 – INOCULATION (1)

(see scheme P1701-DR-010)
The inoculum is contained into a sterile bottle provided with sterile vent filter and diaphragm tandem valves V-803 and V-804 and it is connected to inoculation system with clamps.
It has to be sterilized the seed pipe with steam.
Actions:

- Start from all valves closed, V-801 to V-804
- Open V-803
- Open slowly V-802
- When steam vapour exit through V-803, it will be partially closed
- This conditions have to be kept for 20 – 30 minutes
- Closed all of valves and cooling down

STEP 11 – INOCULATION (2)

(see scheme P1701-DR-011)
Inoculum load is carried out using recirculation system in the follow way:

- Open recycle valves V-401; V-402; V-404; V-405 and V-411
- Start up P-01
- Set FIC-02 in MAN 100%
- Check FT-02 flow measurement
- Open V-801 and V-804 and simultaneously partially close V-401 until inoculum bottle is empty.

When inoculation is finished, V-801 and V-803 will be closed and V-401 will be completely opened. Inoculation bottle can be removed.
Recirculation flow rate is set changing FIC-02 to AUTO with SP required

STEP 12 – PRODUCTION

(see scheme P1701-DR-012)
Immediately after finish the inoculation, the aeration has to be started.
Actions:

- Cooling of condenser. Already running
- Outlet Gas filtration. Already running

- Pressure control on top. Already running
- Open the gas system: Open V-324 and valves of F-06/A (or B)
- Put FIC-07 in AUTO SP=3.000ml/min.
- Start up compressor CC-01
- Start up stirrer AC-01

It has to be set in AUTO DO2IC, dissolved oxygen measurement, and the control of additions of gases O2; CO2 and N2.
Temperature control TIC-04 was already running.

It has to be prepared the pH control system.
Actions:
Acid:

- Connect acid bottle to pump P-02
- Tare weight WI-01
- Open acid line opening V-102, V-105 and V-106
- Change P-02 to REM to allow pH-Controller to start up it

Base:

- Connect base bottle to pump P-03
- Tare weight WI-02
- Open base line opening V-122, V-125 and V-126
- Change P-03 to REM to allow pH-Controller to start up it

It has to be changed pHIC-01 to AUTO with SP=8

It has to be prepared liquid exit system.
Actions:

- Open vent of D-04, opening valves V-609 and V-611
- It has to be changed TIC-03 to AUTO with SP=4ºC (opening V-605, V-606)
- Open V-601 and V-603
- Reset FIQ-06
- Set LIC-01 to AUTO with SP=(to be adjusted in start up)
- It has to be started the analyses system to NH4; NO2 and NO3

It has to be closed the compressed air entrance and pressurizing, closing V-202; V-204 and V-206.

It has to be started the continuous addition of medium.
Actions:

- Open addition line, opening V-154; V-156;V-159 and V-160
- Start up P-04
- Reset FIC-01
- Set FIC-01 to AUTO with SP required

Recirculation flow rate is set as ratio of feeding. To set FIC-02 in REM with RATIO=6

STEP 13 – BACKWASHING

(see scheme P1701-DR-013)
When bed pressure drop was excessive (showed in DPI-01) it has to be proceed to do a backwashing.
Actions:

- Cut off addition of medium, stopping P-04
- Cut off recirculation, stopping P-01

- Close V-402 and V-409
- Open V-412 and V-413
- Start up P-06, controlled by frequency converter FV-06 with the set point defined in the start up.

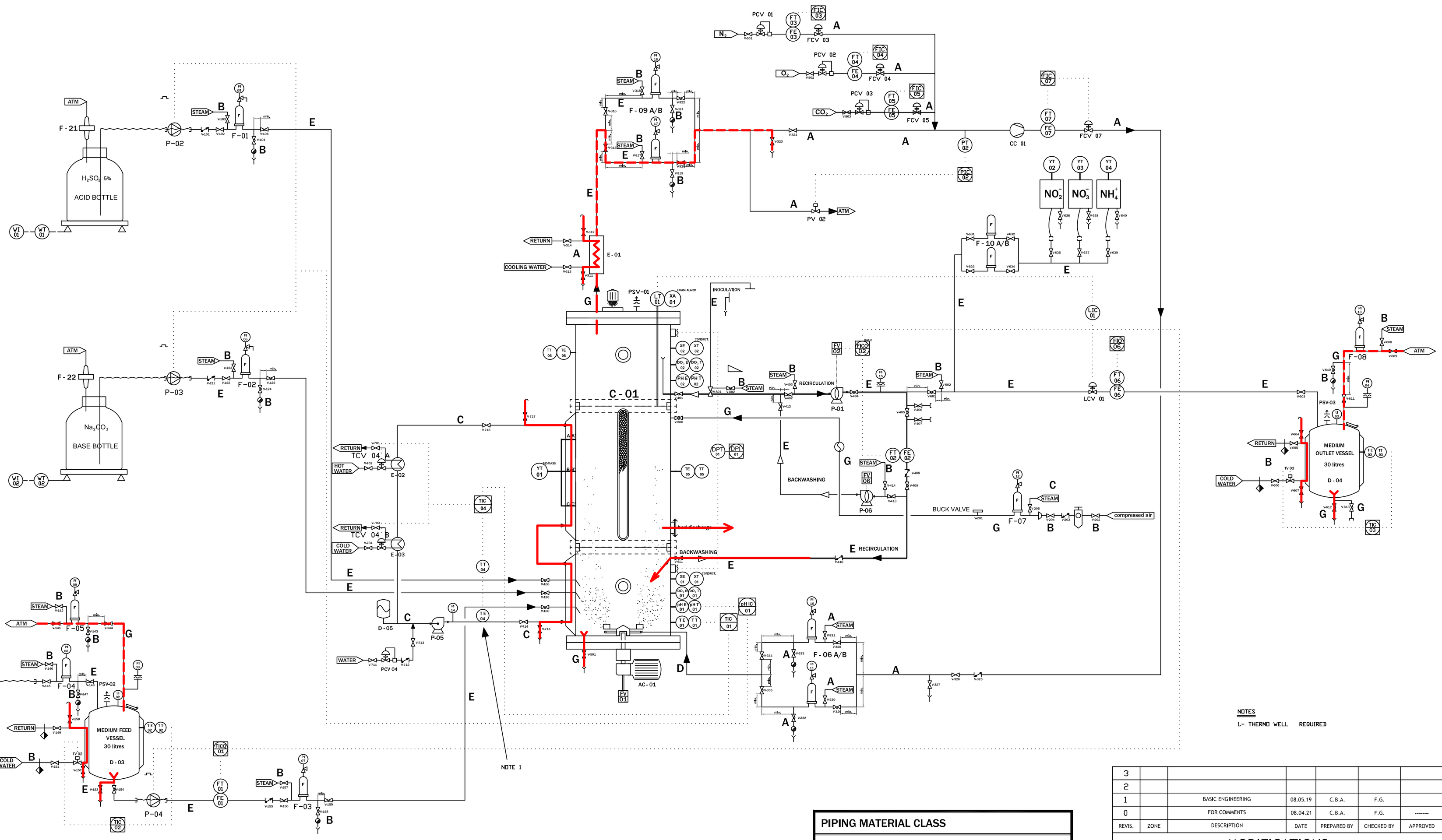
It has to be kept in these conditions the required time and after it, it becomes to the production conditions.

STEP 14 – FILTER CHANGE

Any moment during production step could be necessary to put into service one of the backup filters or replace one cartridge.

In any case, the Actions are:

- Close filter valves, before and later.
- Replace cartridge.
- Sterilize new cartridge opening steam valve and drainage valve.
- Cooling down
- Put into service



NOTES

1.- THERMO WELL REQUIRED

PIPING MATERIAL CLASS

CLASS	SPECIFICATION and SIZE
A	TUBING AISI 316 L 6/8
B	TUBING AISI 316 L 8/10
C	TUBING AISI 316 L 10/12
D	SANITARY AISI 316 L DN 6
E	SANITARY AISI 316 L DN 8
F	SANITARY AISI 316 L DN 10
G	SANITARY AISI 316 L DN 15

REVIS.	ZONE	DESCRIPTION	DATE	PREPARED BY	CHECKED BY	APPROVED
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1		BASIC ENGINEERING	08.05.19	C.B.A.	F.G.	
0		FOR COMMENTS	08.04.21	C.B.A.	F.G.	------

MODIFICATIONS

7+i Ingenieros Consultores

CLIENT: Melissa P.P. U.A.B.

PROJECT: Melissa Pilot Plant Compartment III

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FORMAT: A2

SCALE: S/E

DRAWING TITLE: STEP 1 EMPTYING

DRAWING NUMBER: P1701-DR-002

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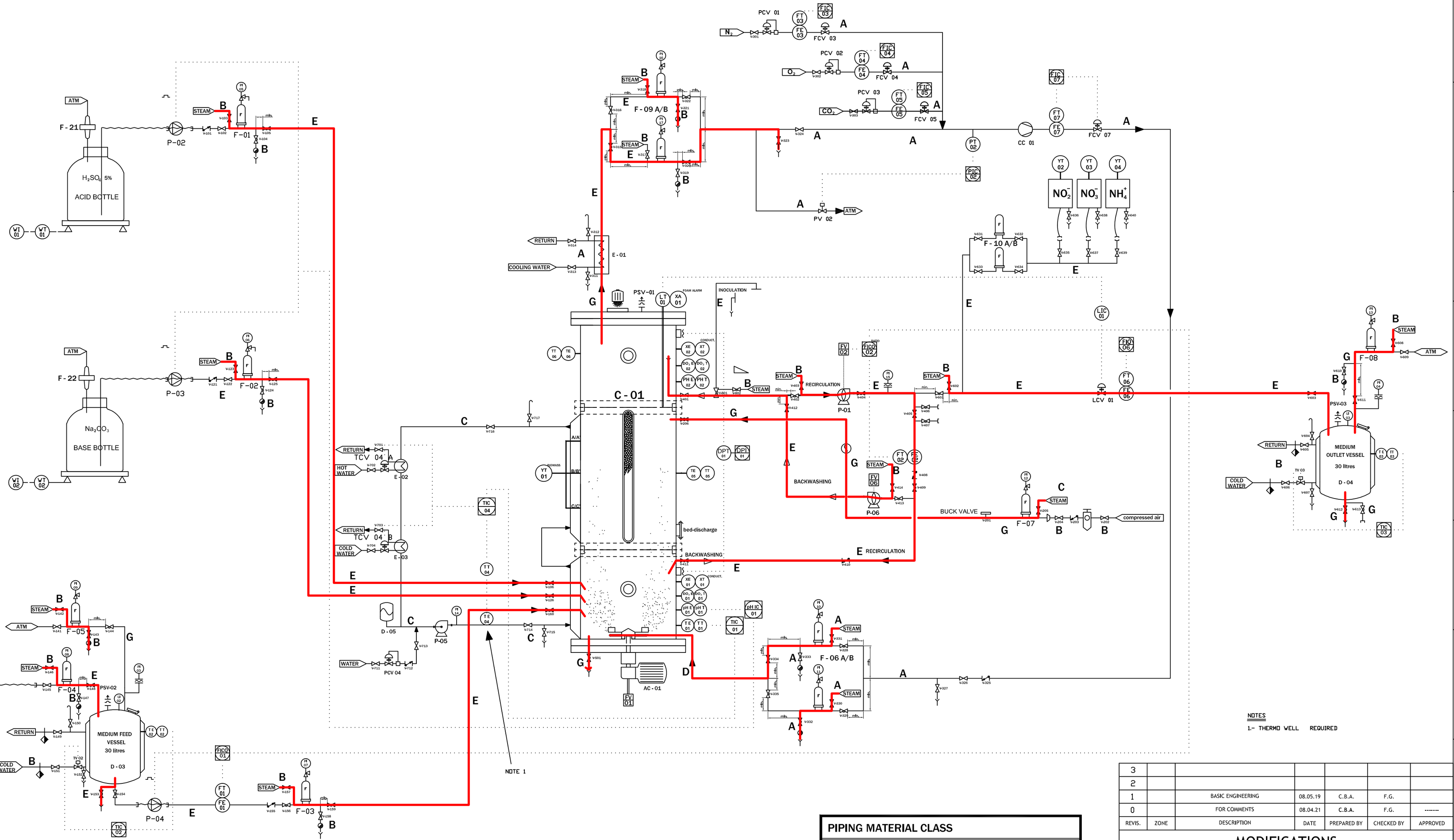

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FORMAT: A2

SCALE: S/E

DRAWING TITLE: STEP 2 STERILIZATION 1 (TO RISE 90ºC)

DRAWING NUMBER: P1701-DR-003

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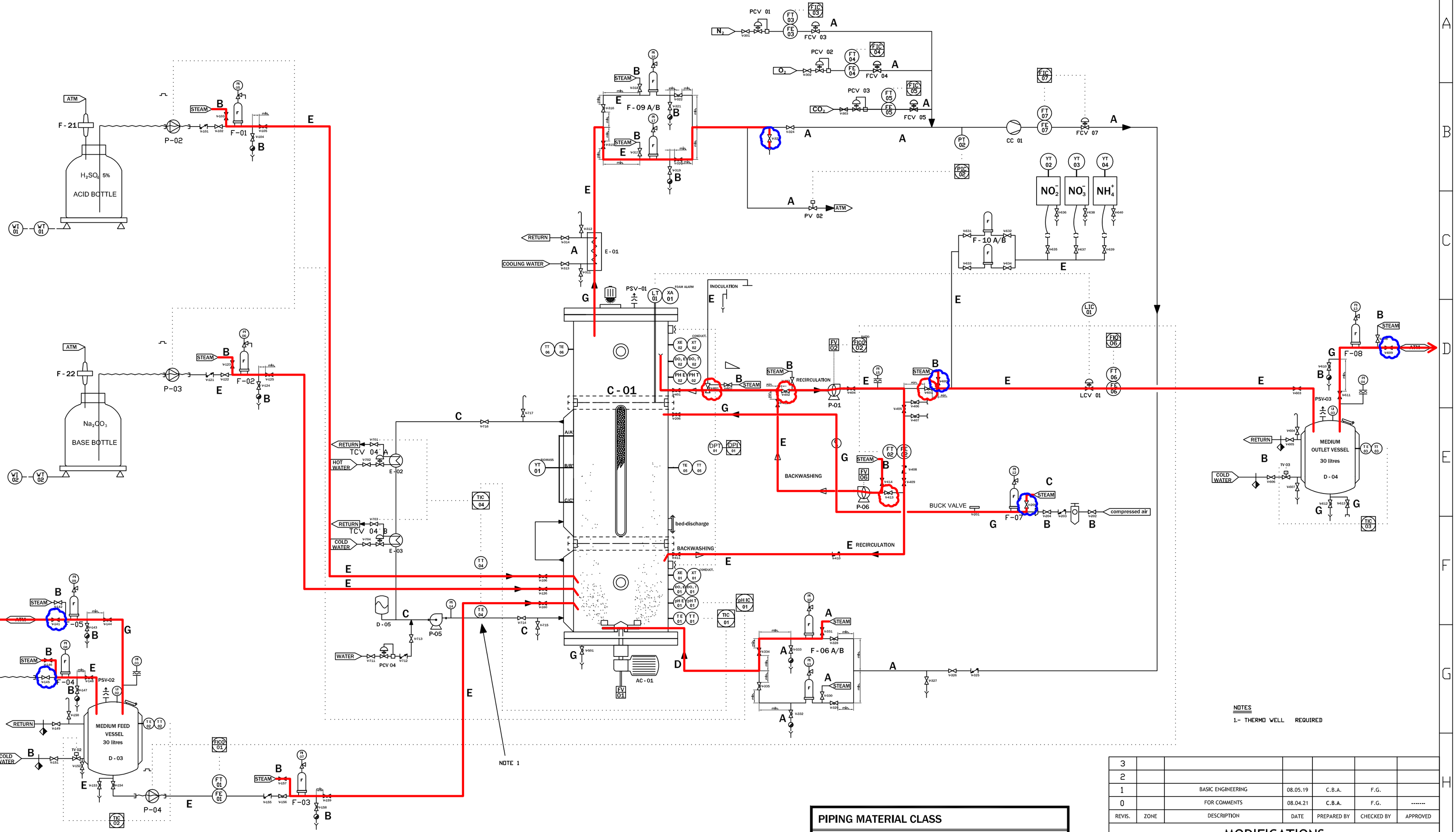

NOTES

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VALVES CLOSED and OPENED DURING THE PROCESS

VALVES PARTIALY OPEN

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SCALE: S/E

DRAWING TITLE: STEPS 3 and 4
STERILIZATION 2 (to rise 121 °C)
STERILIZATION 3 (30 minutes)

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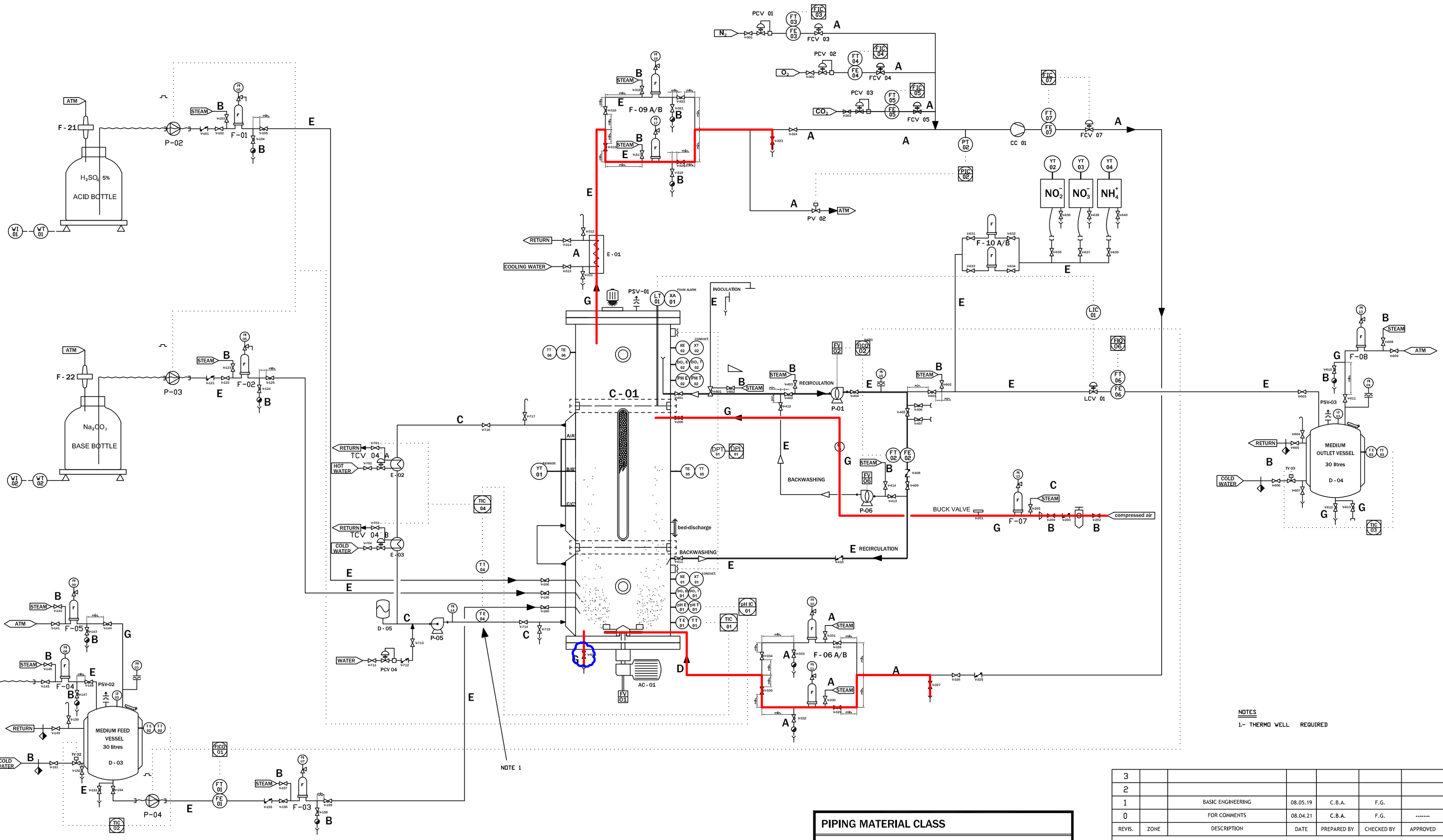

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FORMAT: A2

SCALE: S/E

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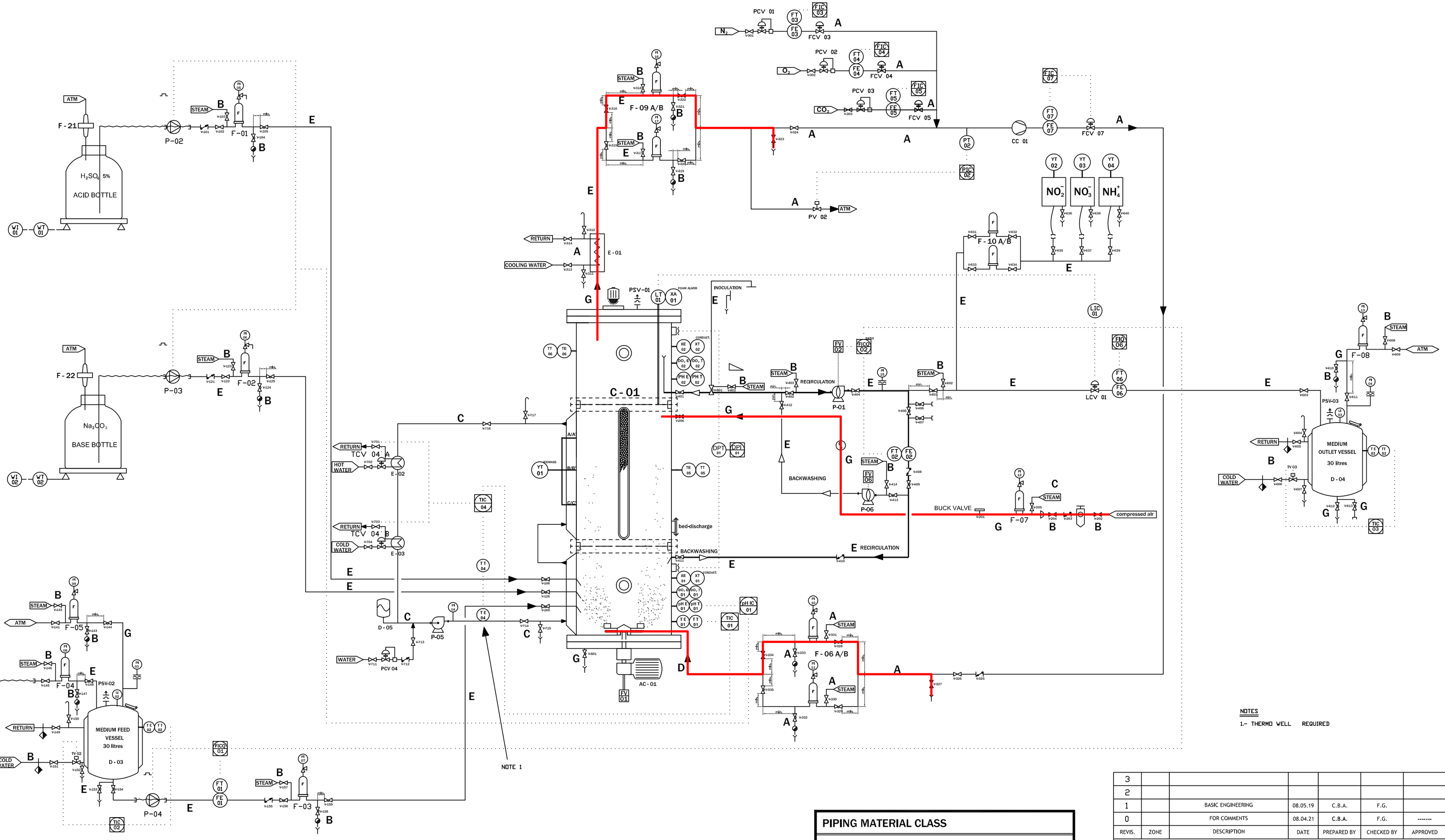

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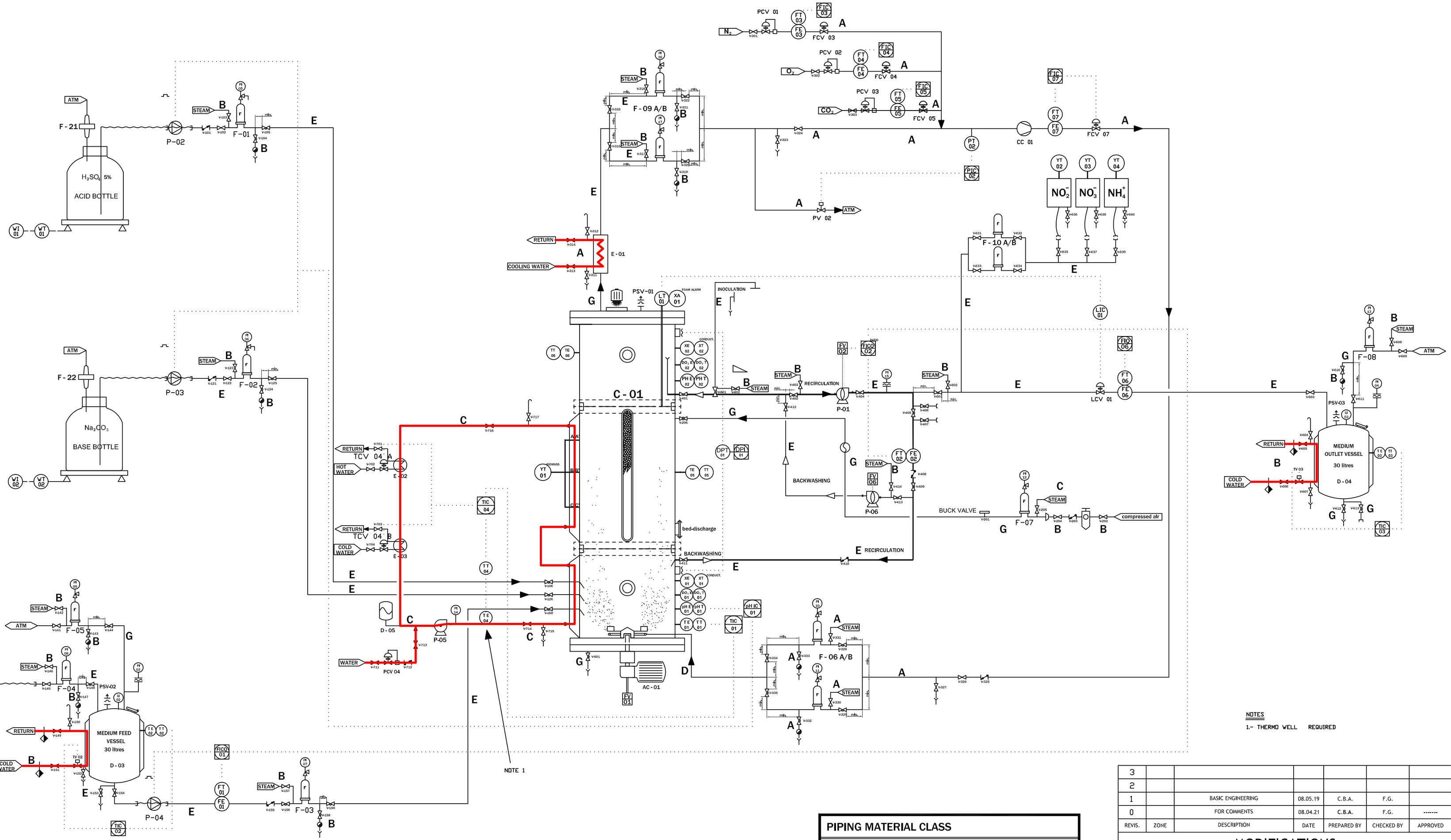

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SCALE: S/E

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DRAWING NUMBER: P1701-DR-007

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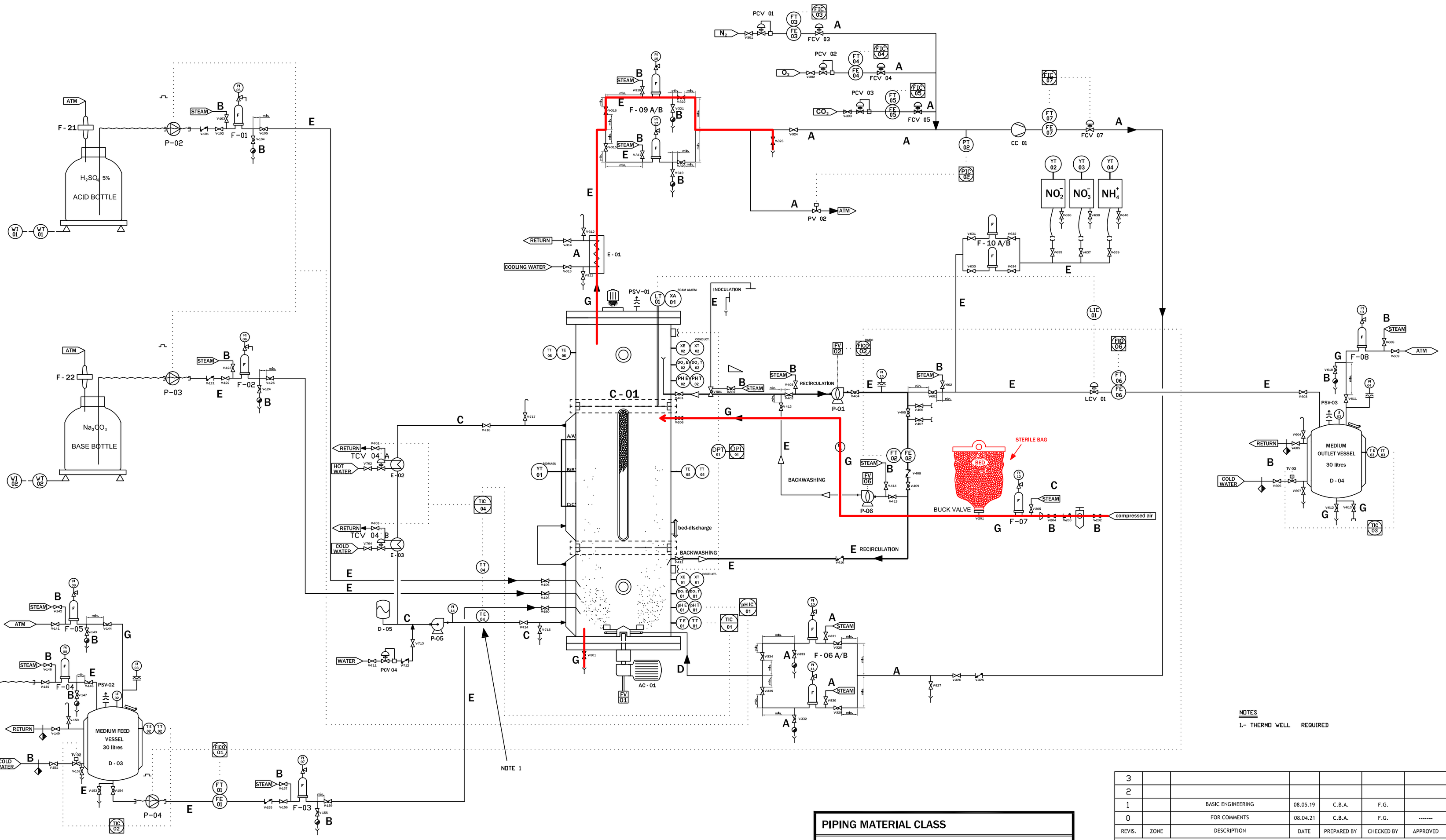

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SCALE: S/E

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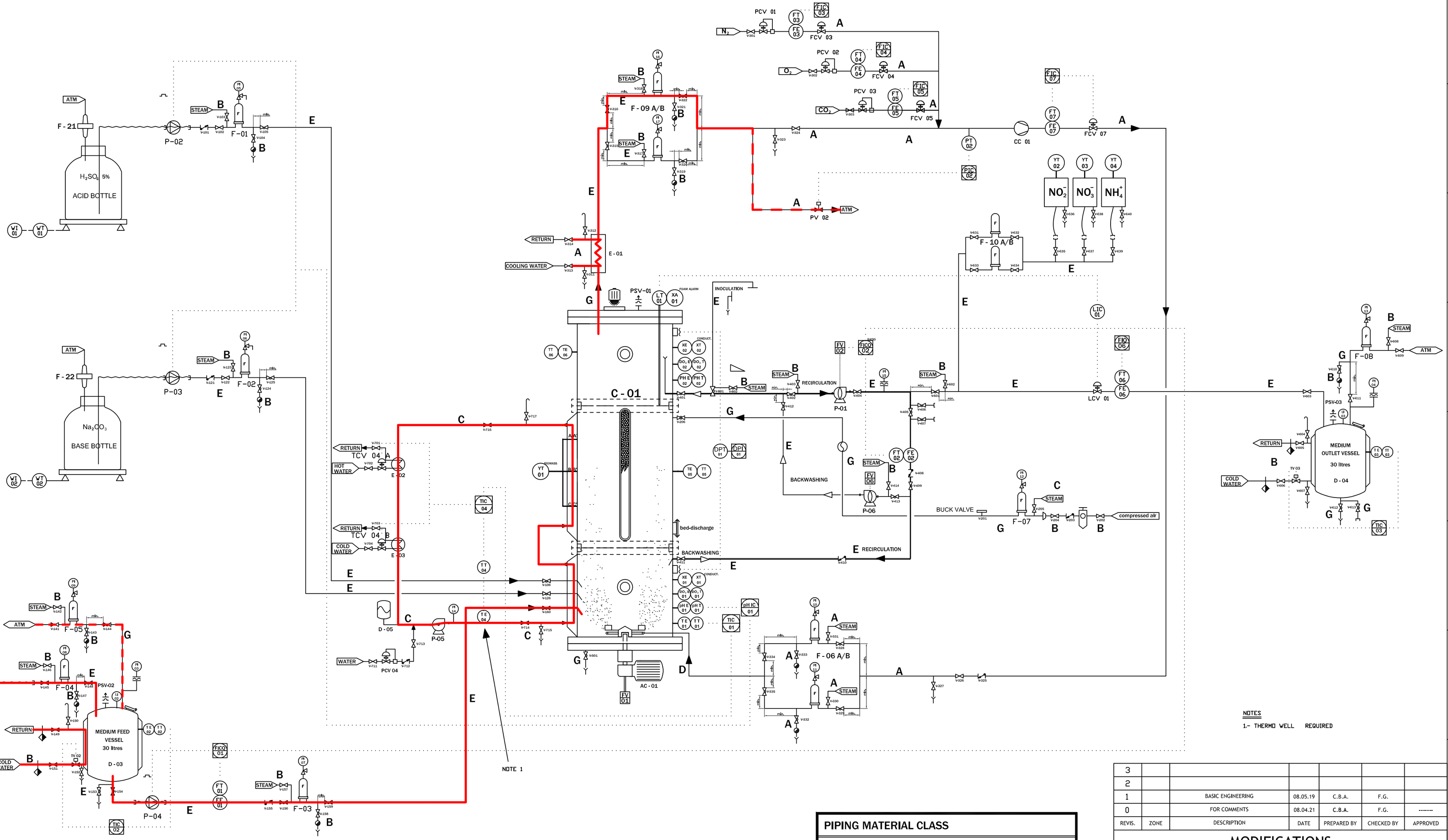

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CLIENT: Melissa P.P. U.A.B.

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NAME	------	------	------	------
DATE	------	------	------	------

PROJECT: Melissa Pilot Plant Compartment III

FORMAT: A2

SCALE: S/E

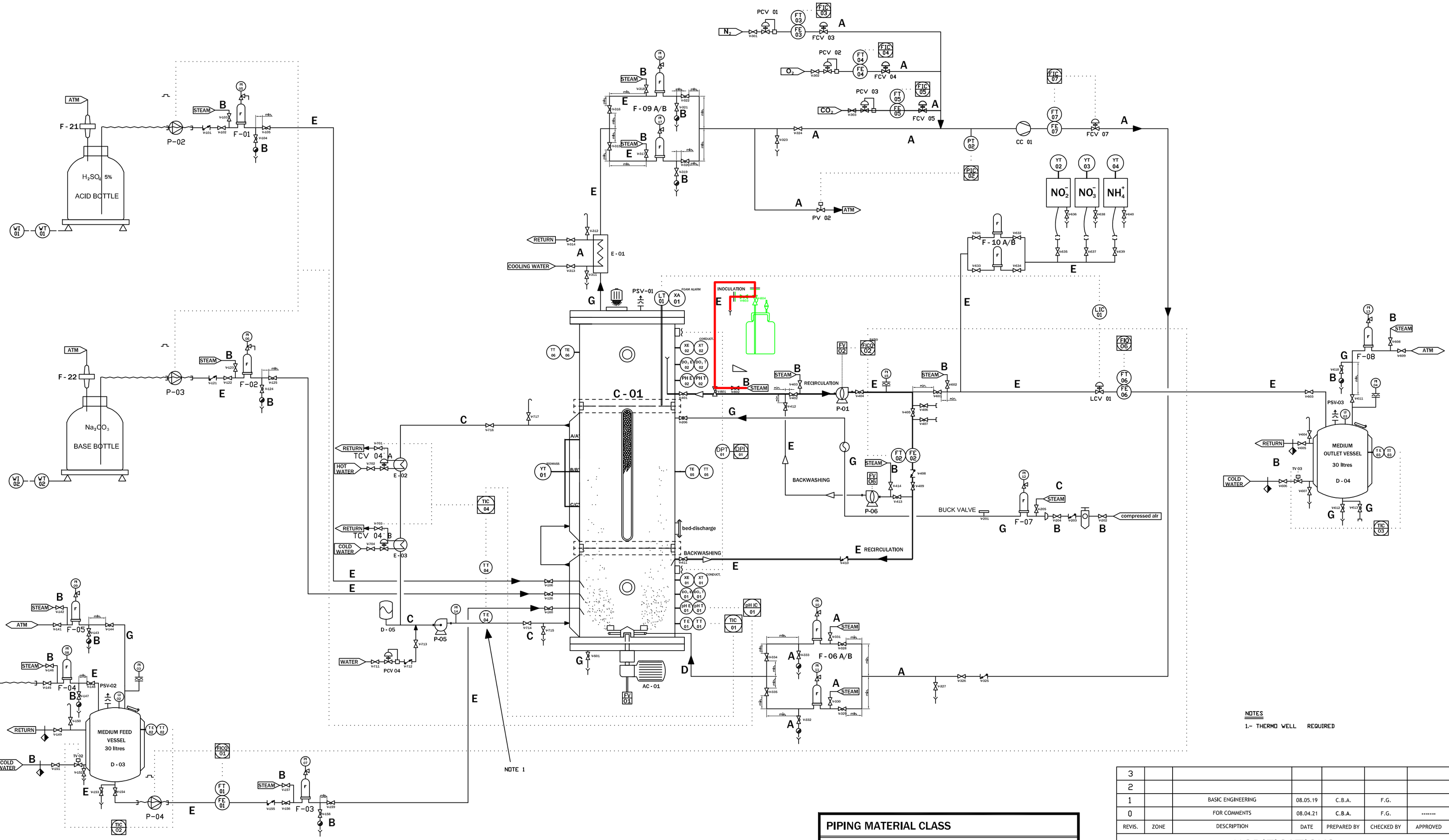
DRAWING TITLE: STEP 9 FILLING MEDIA

DRAWING NUMBER: P1701-DR-009

ARCHIVE: P1701-DR-0.dwg

HOJA 1 DE 1

REV. 0



NOTES

1.- THERMO WELL REQUIRED

PIPING MATERIAL CLASS

CLASS	SPECIFICATION and SIZE
A	TUBING AISI 316 L 6/8
B	TUBING AISI 316 L 8/10
C	TUBING AISI 316 L 10/12
D	SANITARY AISI 316 L DN 6
E	SANITARY AISI 316 L DN 8
F	SANITARY AISI 316 L DN 10
G	SANITARY AISI 316 L DN 15

REVIS.	ZONE	DESCRIPTION	DATE	PREPARED BY	CHECKED BY	APPROVED
3						
2						
1		BASIC ENGINEERING	08.05.19	C.B.A.	F.G.	
0		FOR COMMENTS	08.04.21	C.B.A.	F.G.	-------

MODIFICATIONS

7+i Ingenieros Consultores

CLIENT: Melissa P.P. U.A.B.

PROJECT: Melissa Pilot Plant Compartment III

	DESIGNED BY	CHECKED BY	APPROVED	APPROVED CONSTRUCTION
NAME	-----	-----	-----	-----
DATE	-----	-----	-----	-----

FORMAT: A2

SCALE: S/E

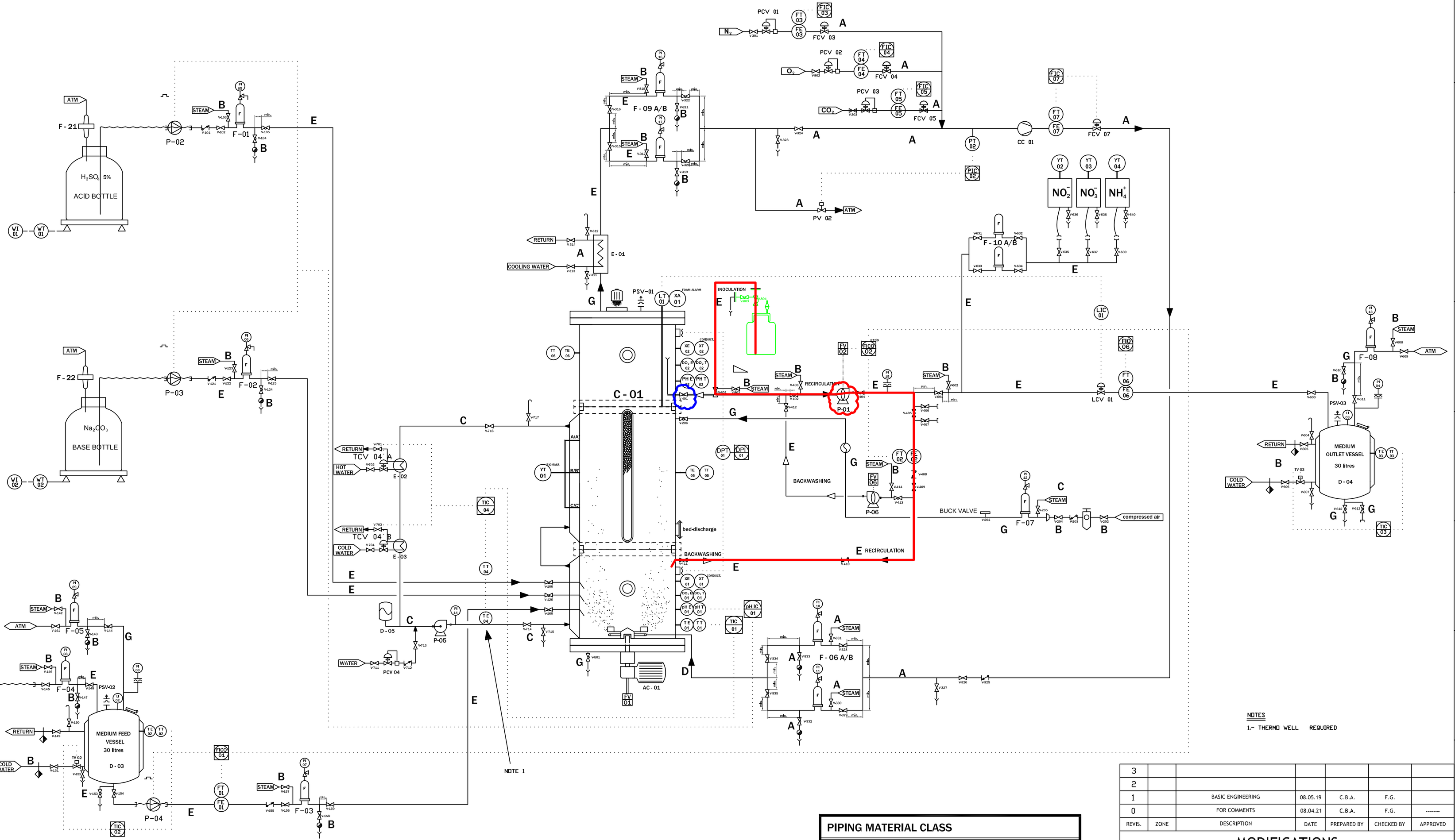
DRAWING TITLE: STEP 10 INOCULATION (1)

DRAWING NUMBER: P1701-DR-010

HOJA 1 DE 1

REV. 0

ARCHIVE: P1701-DR-0.dwg



PIPING MATERIAL CLASS

CLASS	SPECIFICATION and SIZE
A	TUBING AISI 316 L 6/8
B	TUBING AISI 316 L 8/10
C	TUBING AISI 316 L 10/12
D	SANITARY AISI 316 L DN 6
E	SANITARY AISI 316 L DN 8
F	SANITARY AISI 316 L DN 10
G	SANITARY AISI 316 L DN 15

EQUIPMENT RUNNING

VALVES PARTIALY OPEN

REVIS.	ZONE	DESCRIPTION	DATE	PREPARED BY	CHECKED BY	APPROVED
3						
2						
1		BASIC ENGINEERING	08.05.19	C.B.A.	F.G.	
0		FOR COMMENTS	08.04.21	C.B.A.	F.G.	-------

MODIFICATIONS

7+i Ingenieros Consultores

CLIENT: Melissa P.P. U.A.B.

PROJECT: Melissa Pilot Plant Compartment III

	DESIGNED BY	CHECKED BY	APPROVED	APPROVED CONSTRUCTION
NAME	-----	-----	-----	-----
DATE	-----	-----	-----	-----

FORMAT: A2

SCALE: S/E

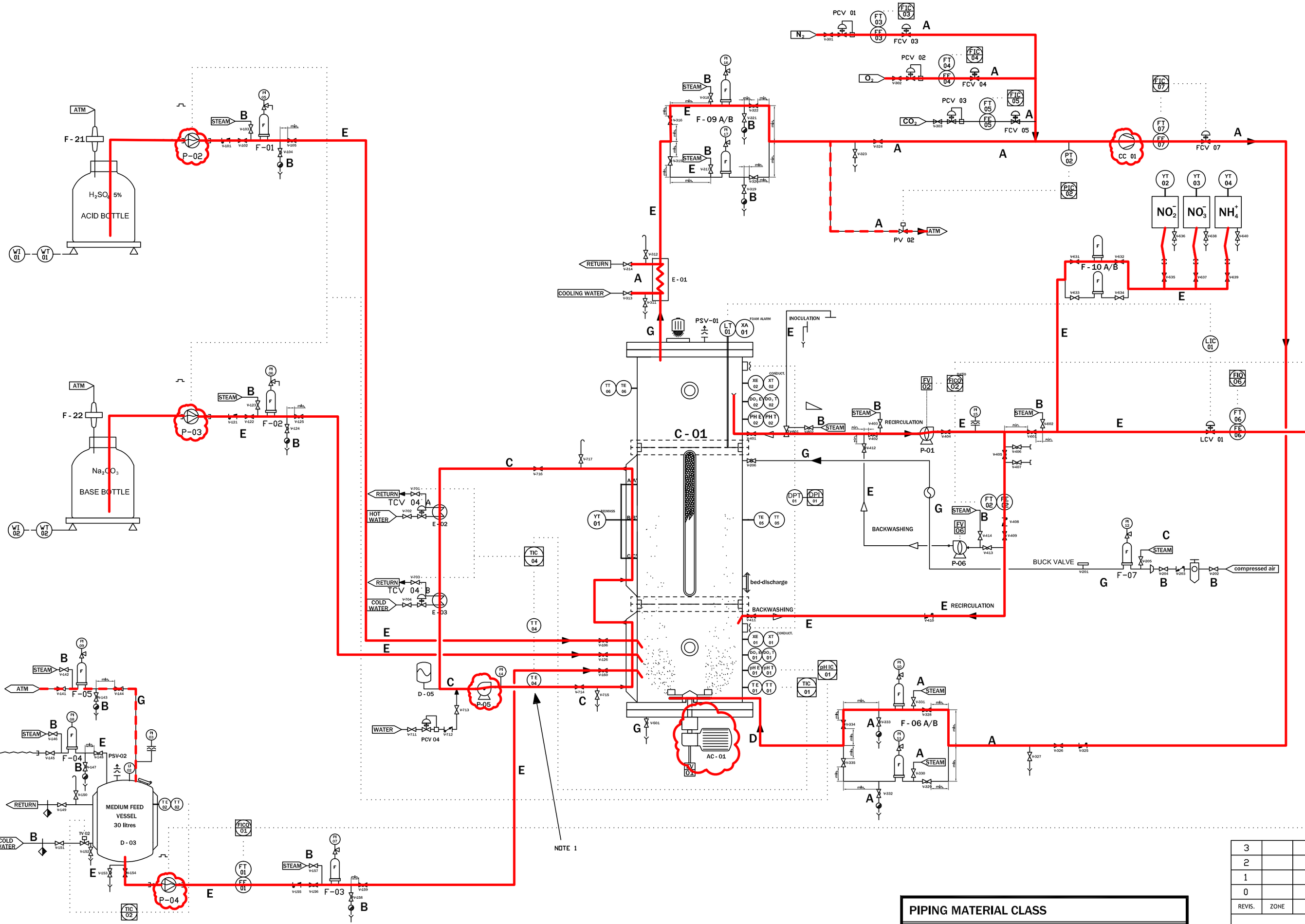
DRAWING TITLE: STEP 11 INOCULATION (2)

DRAWING NUMBER: P1701-DR-011

ARCHIVE: P1701-DR-0.dwg

HOJA 1 DE 1

REV. 0



NOTES

1.- THERMO WELL REQUIRED

PIPING MATERIAL CLASS

CLASS	SPECIFICATION and SIZE
A	TUBING AISI 316 L 6/8
B	TUBING AISI 316 L 8/10
C	TUBING AISI 316 L 10/12
D	SANITARY AISI 316 L DN 6
E	SANITARY AISI 316 L DN 8
F	SANITARY AISI 316 L DN 10
G	SANITARY AISI 316 L DN 15

REVIS.	ZONE	DESCRIPTION	DATE	PREPARED BY	CHECKED BY	APPROVED
3						
2						
1		BASIC ENGINEERING	08.05.19	C.B.A.	F.G.	
0		FOR COMMENTS	08.04.21	C.B.A.	F.G.	-------

MODIFICATIONS

7+i Ingenieros Consultores

CLIENT: Melissa P.P. U.A.B.

	DESIGNED BY	CHECKED BY	APPROVED	APPROVED CONSTRUCTION
NAME	------	------	------	------
DATE	------	------	------	------

PROJECT: Melissa Pilot Plant Compartment III

FORMAT: A2

SCALE: S/E

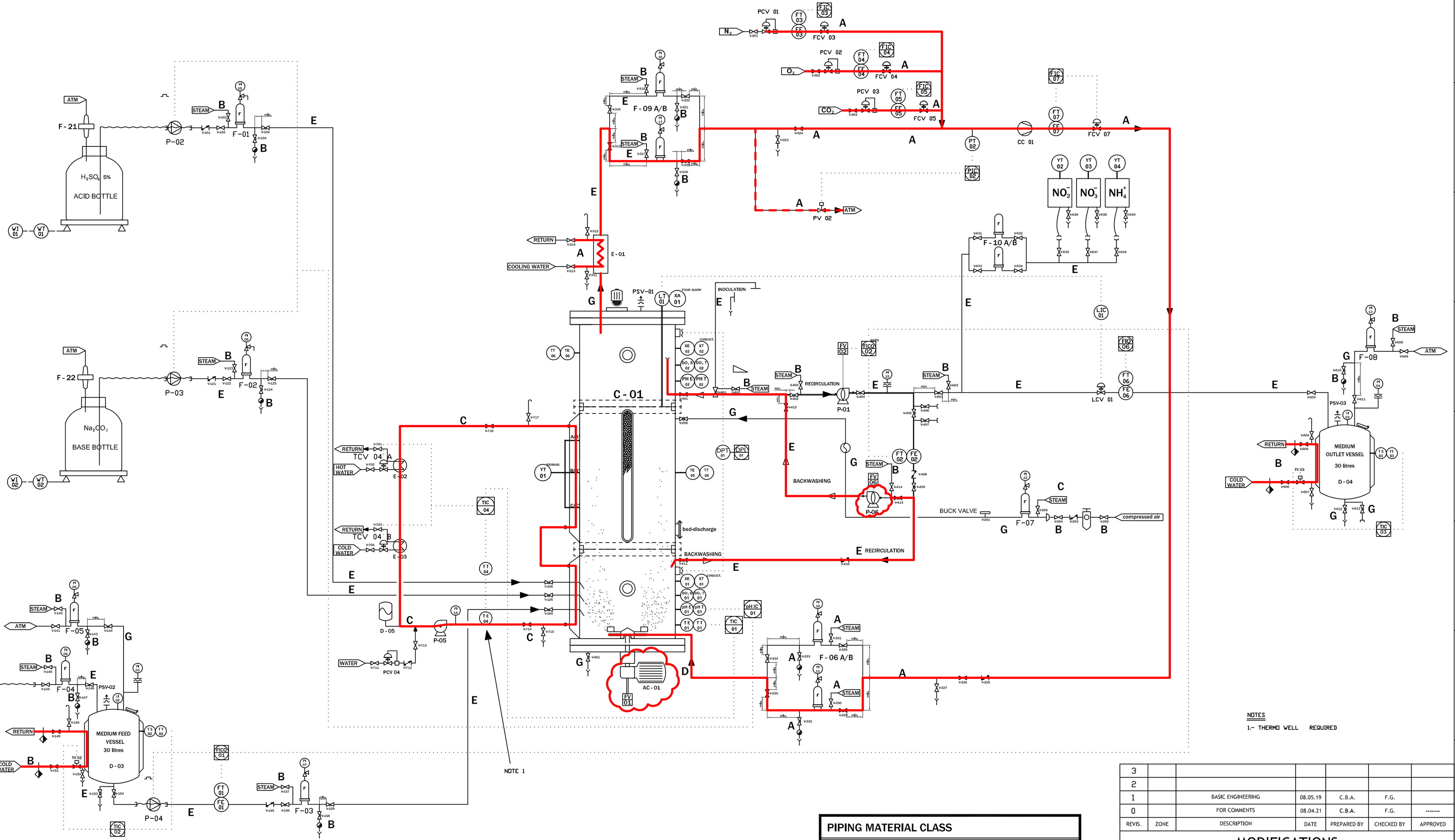
DRAWING TITLE: STEP 12 PRODUCTION

DRAWING NUMBER: P1701-DR-012

ARCHIVE: P1701-DR-0.dwg

HOJA 1 DE 1

REV. 0



NOTES

1.- THERMO WELL REQUIRED

EQUIPMENT RUNNING

PIPING MATERIAL CLASS	
CLASS	SPECIFICATION and SIZE
A	TUBING AISI 316 L 6/8
B	TUBING AISI 316 L 8/10
C	TUBING AISI 316 L 10/12
D	SANITARY AISI 316 L DN 6
E	SANITARY AISI 316 L DN 8
F	SANITARY AISI 316 L DN 10
G	SANITARY AISI 316 L DN 15

REVIS.	ZONE	DESCRIPTION	DATE	PREPARED BY	CHECKED BY	APPROVED
3						
2						
1		BASIC ENGINEERING	08.05.19	C.B.A.	F.G.	
0		FOR COMMENTS	08.04.21	C.B.A.	F.G.	-------

MODIFICATIONS

7+i Ingenieros Consultores

CLIENT: Melissa P.P. U.A.B.

	DESIGNED BY	CHECKED BY	APPROVED	APPROVED CONSTRUCTION
NAME	------	------	------	------
DATE	------	------	------	------

PROJECT: Melissa Pilot Plant Compartment III

FORMAT: A2

SCALE: S/E

DRAWING TITLE: STEP 13 BACKWASHING

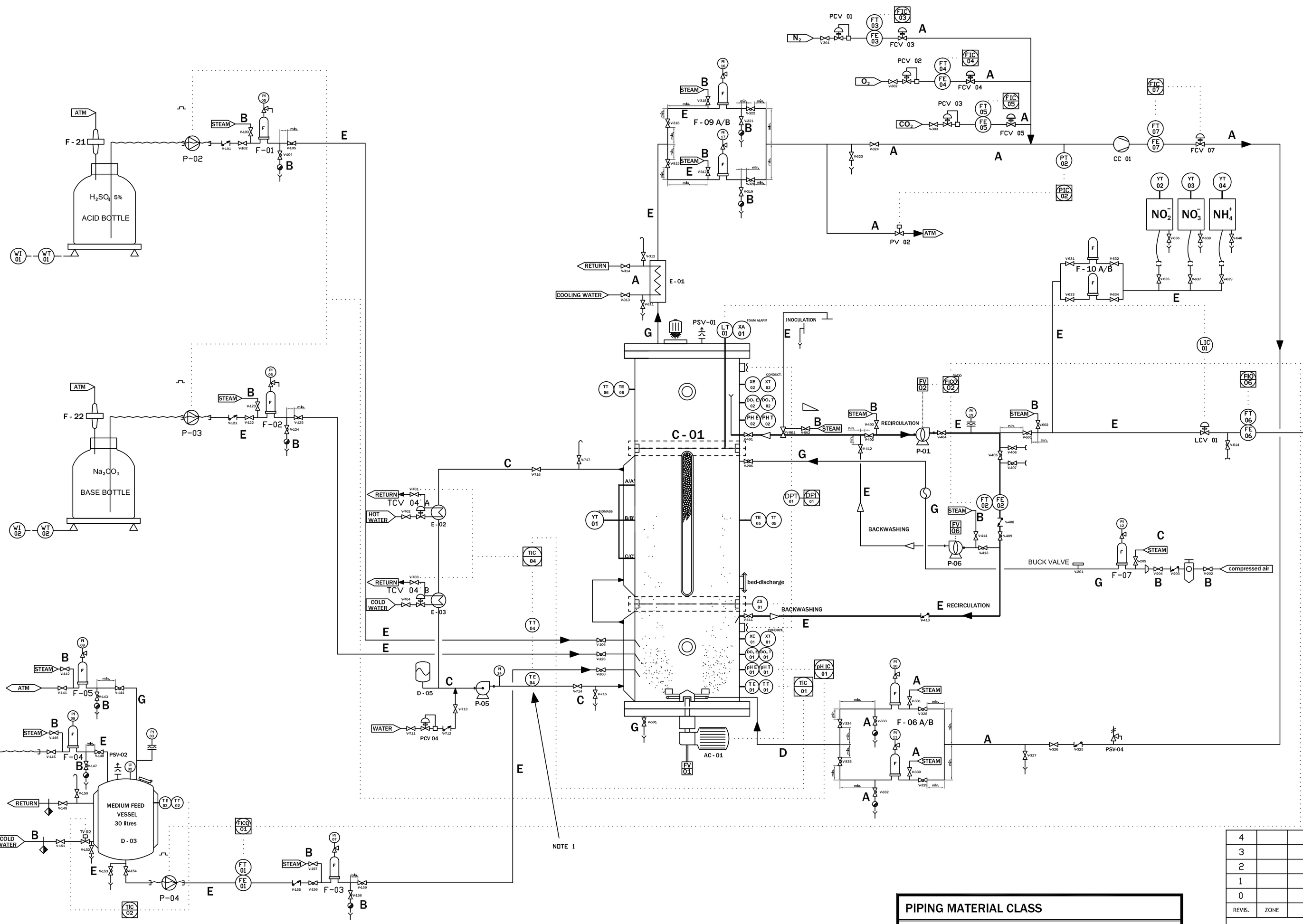
DRAWING NUMBER: P1701-DR-013

ARCHIVE: P1701-DR-0.dwg

HOJA 1 DE 1

REV. 0

2. PID



NOTES

1.- THERMO WELL REQUIRED

PIPING MATERIAL CLASS

CLASS	SPECIFICATION and SIZE
A	TUBING AISI 316 L 6/8
B	TUBING AISI 316 L 8/10
C	TUBING AISI 316 L 10/12
D	SANITARY AISI 316 L DN 6
E	SANITARY AISI 316 L DN 8
F	SANITARY AISI 316 L DN 10
G	SANITARY AISI 316 L DN 15

REVIS.	ZONE	DESCRIPTION	DATE	PREPARED BY	CHECKED BY	APPROVED
4		GENERAL REVISION	08.06.06	C.B.A.		
3		HAZOP REVIEW	08.05.26	C.B.A.		
2		PROCESS MODIFICATION	08.05.07	C.B.A.		
1		FOR APPROVAL	08.04.21	C.B.A.	P.G.M.	
0		FOR COMMENTS	08.04.08	C.B.A.	P.G.M.	------

MODIFICATIONS

CLIENT: Melissa P.P. U.A.B.

PROJECT: Melissa Pilot Plant Compartment III

	DESIGNED BY	CHECKED BY	APPROVED	APPROVED CONSTRUCTION
NAME	-----	-----	-----	-----
DATE	-----	-----	-----	-----

FORMAT: A2

SCALE: S/E

DRAWING TITLE: P&I COMPARTMENT III

DRAWING NUMBER:

ARCHIVE: P1701-DR-0.dwg

HOJA 1 DE 1

REV. 4

3. EQUIPMENT AND INSTRUMENT LISTS

3.1. Equipment List
3.2. Instrument List

EQUIPMENT LIST

REV.	DATE	PREP.	REMARKS	SIGN	APPROVAL	DATE	SIGN
0	08/04/2008	C.B.A.	PRELIMINAR		J.R.E	08/04/2008	
1	21/04/2008	C.B.A.	FOR APPROVAL				
2	29/04/2008	C.B.A.	BASIC ENGINEERING		P.G.M.	30/04/2008	
3	07/05/2008	C.B.A.	NEW PUMP P-06		J.R.E.	07/05/2008	

7+ Ingenieros Consultores	EQUIPMENT LIST	CLIENT : MELISSA
PROJECT Nº: P1701	M.P.P. COMPARTMENT III	DOC. Nº : P1701 - LE - 001 - 3

ITEM	QUANTITY	DATA SHEET	EQUIPMENT	SERVICE	DIMENSIONS (mm)	WEIGHT (kg)	UTILITIES	SUPPORT	ORIGIN	REMARKS
C- 01	1	P1701-EQ-HD-001	BIOREACTOR	FERMENTATION					NEW	
AC- 01 + FV 01	1	EQ-HD-002	BIOREACTOR MIXER+ FREQUENCY VARIATOR	MIXING					NEW	
D- 03	1	EQ-HD-003	VESSEL	MEDIUM FEED VESSEL					NEW	
D- 04	1	EQ-HD-004	VESSEL	MEDIUM OUTLET VESSEL					NEW	
D- 05	1	EQ-HD-005	EXPANSION VESSEL	HEATING / COOLING WATER CIRCULATION					NEW	
E- 01	1		CONDENSER	CONDENSATION					M.P.P.	
E- 02	1	EQ-HD-101	EXCHANGER	HEATING					NEW	
E- 03	1	EQ-HD-102	EXCHANGER	COOLING					NEW	
CC- 01	1	EQ-HD-201	COMPRESSOR	GAS RECIRCULATION					NEW	
P- 01 + FV02	1	EQ-HD-301	PUMP+ FREQUENCY VARIATOR	RECIRCULATION					NEW	
P- 02	1		PUMP	ACID ADDITION					M.P.P.	
P- 03	1		PUMP	BASE ADDITION					M.P.P.	
P- 04	1	EQ-HD-302	PUMP	MEDIUM FEED					NEW	
P- 05	1	EQ-HD-303	PUMP	HEATING / COOLING WATER CIRCULATION					NEW	
P-06 + FV06		EQ-HD-304	PUMP+ FREQUENCY VARIATOR	BACKWASHING					NEW	
F- 01	1	EQ-HD-401	FILTER	STERILE FILTRATION OF ACID					NEW	
F- 02	1	EQ-HD-402	FILTER	STERILE FILTRATION OF BASE					NEW	
F- 03	1	EQ-HD-403	FILTER	STERILE FILTRATION OF MEDIUM					NEW	
F- 04	1	EQ-HD-404	FILTER	STERILE FILTRATION OF MEDIUM LOAD					NEW	

7+ Ingenieros Consultores	**EQUIPMENT LIST**	CLIENT : MELISSA
PROJECT Nº: P1701	M.P.P. COMPARTMENT III	DOC. Nº : P1701 - LE - 001 - 3

ITEM	QUANTITY	DATA SHEET	EQUIPMENT	SERVICE	DIMENSIONS (mm)	WEIGHT (kg)	UTILITIES	SUPPORT	ORIGIN	REMARKS
F- 05	1	EQ-HD-405	FILTER	STERILE VENTING FILTER OF D-03					NEW	
F- 06 A/B	2	EQ-HD-406	FILTER	SAMPLE FILTRATION OF GAS					NEW	
F- 07	1	EQ-HD-407	FILTER	STERILE FILTRATION OF COMPRESSED AIR					NEW	
F- 08	1	EQ-HD-408	FILTER	STERILE VENTING FILTER OF D-04					NEW	
F- 09 A/B	2	EQ-HD-409	FILTER	OUTLET GAS FILTRATION					NEW	
F- 10 A/B		EQ-HD-410	FILTER	SAMPLE FILTRATION					NEW	
F- 21	1		FILTER	ACID BOTTLE					M.P.P.	
F- 22	1		FILTER	BASE BOTTLE					M.P.P.	

7+ Ingenieros Consultores	**INSTRUMENT LIST**	**CLIENT:** MELISSA
PROJECT Nº: P1701	M.P.P. COMPARTMENT III	**DOC. Nº: P1701- LI - 001- 3**

REV.	DATE	PREP.	REMARKS	SIGN	APPROVAL	DATE	SIGN
0	08/04/2008	C.B.A.	PRELIMINAR		J.R.E.	08/04/2008	
1	21/04/2008	C.B.A.					
2	29/04/2008	P.G.M.	FOR APPROVAL				
3	26/05/2008	C.B.A.	HAZOP REVIEW				

7+ Ingenieros Consultores	**INSTRUMENT LIST**	CLIENT: MELISSA
PROJECT Nº: P1701	M.P.P. COMPARTMENT III	**DOC. Nº: P1701- LI - 001- 3**

LOOP	TAG	INSTRUMENT	SERVICE	DATA SHEET	ORIGIN	REMARKS
LEVEL						
LIC 01	LT 01 LIC 01 LCV 01	level transmitter PID controler level control valve	bioreactor	P1701-IC-HD-001 IC-HD-002	NEW	TO EXISTING DCS
LI 02	LI 02	level indicator	medium feed vessel	IC-HD-003	NEW	
LI 03	LI 03	level indicator	medium outlet vessel	IC-HD-004	NEW	
FLOW						
FICQ 01	FE 01 FT 01 FICQ 01	flow sensor coriolis type flow transmitter PID controler	medium feed	IC-HD-101	NEW	FICQ 01 over P-04 TO EXISTING DCS
FICQ 02	FE 02 FT 02 FICQ 02	mass flow sensor flow transmitter PID controler	recirculation bioreactor	IC-HD-102	NEW	FICQ 02 over FV-02 of P-01 TO EXISTING DCS
FIC 03	FE 03 FT 03 FIC 03 FCV 03	mass flow sensor flow transmitter PID controler flow control valve	nitrogen		M.P.P	TO EXISTING DCS
FIC 04	FE 04 FT 04 FIC 04 FCV 04	mass flow sensor flow transmitter PID controler flow control valve	oxygen		M.P.P	TO EXISTING DCS
FIC 05	FE 05 FT 05 FIC 05 FCV 05	mass flow sensor flow transmitter PID controler flow control valve	carbon dioxide		M.P.P	TO EXISTING DCS
FIQ 06	FE 06 FT 06 FIQ 06	flow sensor coriolis type flow transmitter flow totalizer	medium outlet	IC-HD-103	NEW	TO EXISTING DCS
FIC 07	FE 07 FT 07 FIC 07 FCV 07	vortex mass flow sensor flow transmitter PID controler flow control valve	outlet gas	IC-HD-104 IC-HD-105	NEW	TO EXISTING DCS
pH						
pHIC 01	pH E 01 pHT 01 pHIC 01	pH electrode pH transmitter PID controler	bioreactor (lower zone)	IC-HD-406	HOLD	with retractable housing TO EXISTING DCS pHIC 01 over P-02 or P-03
pHI 02	pHE 02 pHT 02 pHI 02	pH electrode pH transmitter pH indicator	bioreactor (upper zone)	IC-HD-407	HOLD	with retractable housing TO EXISTING DCS

7+ Ingenieros Consultores	**INSTRUMENT LIST**	CLIENT: MELISSA
PROJECT Nº: P1701	M.P.P. COMPARTMENT III	**DOC. Nº: P1701- LI - 001- 3**

LOOP	TAG	INSTRUMENT	SERVICE	DATA SHEET	ORIGIN	REMARKS
WEIGHT						
WI 01	WI 01 WT 01	weight indicator weight transmitter	acid addition	IC-HD-401	NEW	HOLD DCS
WI 02	WI 02 WT 02	weight indicator weight transmitter	base addition	IC-HD-401	NEW	HOLD DCS
PRESSURE						
DPI 01	DPI 01 DPT 01	differential pressure indicator differential pressure transmitter	bioreactor	IC-HD-201	NEW	TO EXISTING DCS
PIC 02	PT 02 PIC 02 PV 02	pressure transmitter pressure controler on/off pressure valve	outlet gas	IC-HD-202	NEW NEW M.P.P.	TO EXISTING DCS
PI 03	PI 03	pressure indicator	vessel D-03	IC-HD-203	NEW	diaphragm seal
PI 04	PI 04	pressure indicator	vessel D-04	IC-HD-203	NEW	diaphragm seal
PI 05	PI 05	pressure indicator	F-01	see EQ-HD-401	NEW	
PI 06	PI 06	pressure indicator	F-02	see EQ-HD-402	NEW	
PI 07	PI 07	pressure indicator	F-03	see EQ-HD-403	NEW	
PI 08	PI 08	pressure indicator	F-04	see EQ-HD-404	NEW	
PI 09	PI 09	pressure indicator	F-05	see EQ-HD-405	NEW	
PI 10	PI 10	pressure indicator	F-06 A	see EQ-HD-406	NEW	
PI 11	PI 11	pressure indicator	F-06 B	see EQ-HD-406	NEW	
PI 12	PI 12	pressure indicator	F-07	see EQ-HD-407	NEW	
PI 13	PI 13	pressure indicator	F-08	see EQ-HD-408	NEW	
PI 14	PI 14	pressure indicator	heating/cooling water circulation	IC-HD-204	NEW	
PI 15	PI 15	pressure indicator	recycling and outlet of liquid phase	IC-HD-203	NEW	diaphragm seal
PI 16	PI 16	pressure indicator	F-09 A	see EQ-HD-409	NEW	
PI 17	PI 17	pressure indicator	F-09 B	see EQ-HD-409	NEW	

7+ Ingenieros Consultores

INSTRUMENT LIST

M.P.P. COMPARTMENT III

CLIENT: MELISSA

PROJECT Nº: P1701

DOC. Nº: P1701- LI - 001- 3

LOOP	TAG	INSTRUMENT	SERVICE	DATA SHEET	ORIGIN	REMARKS
TEMPERATURE						
TIC 01	TE 01 TT 01 TIC 01	Pt 100 temperature sensor temperature transmitter PID controler	bioreactor (lower zone)	IC-HD-301	NEW	transm. also to Biomass measure system TO EXISTING DCS output over TIC 04
TIC 02	TE 02 TT 02 TIC 02 TV 02	Pt 100 temperature sensor temperature transmitter PID controler on/off temperature valve	medium feed vessel	IC-HD-301	NEW	TO EXISTING DCS piping
TIC 03	TE 03 TT 03 TIC 03 TV 03	Pt 100 temperature sensor temperature transmitter PID controler on/off temperature valve	medium outlet vessel	IC-HD-301	NEW	TO EXISTING DCS piping
TIC 04	TE 04 TT 04 TIC 04 TCV 04 A TCV 04 B	Pt 100 temperature sensor temperature transmitter PID controler temperature control valve temperature control valve	heating/cooling water circulation	IC-HD-302 IC-HD-305 IC-HD-306	NEW	TO EXISTING DCS piping piping piping
TI 05	TE 05 TT 05	Pt 100 temperature sensor temperature transmitter	bioreactor (middle zone)	IC-HD-301	NEW	to Biomass measure system
TI 06	TE 06 TT 06	Pt 100 temperature sensor temperature transmitter	bioreactor (upper zone)	IC-HD-301	NEW	to Biomass measure system
DISSOLVED OXYGEN						
DO2 I 01	DO2 E 01 DO2 T 01	DO2 electrode (lower zone) DO2 transmitter	bioreactor	IC-HD-408	HOLD	with retractable housing
DO2 I 02	DO2 E 02 DO2 T 02	DO2 electrode (upper zone) DO2 transmitter	bioreactor	IC-HD-409	HOLD	with retractable housing
AUTOREGULATION PRESSURE DEVICES						
PCV 01	PCV 01	pressure valve N2	nitrogen addition		M.P.P.	
PCV 02	PCV 02	pressure valve O2	oxygen addition		M.P.P.	
PCV 03	PCV 03	pressure valve CO2	carbon dioxide addition		M.P.P.	
PCV 04	PCV 04	pressure valve water	heating/cooling water circulation		NEW	piping
PSV 01	PSV 01	rupture disc	bioreactor	IC-HD-501	NEW	
PSV 02	PSV 02	rupture disc	medium feed vessel	IC-HD-501	NEW	
PSV 03	PSV 03	rupture disc	medium outlet vessel	IC-HD-501	NEW	
PSV 04	PSV 04	safety valve	gas recirculation		NEW	
FOAM						
XA 01	XA 01	foam alarm	bioreactor	IC-HD-001	NEW	included in LT 01

7+ Ingenieros Consultores	INSTRUMENT LIST	CLIENT: MELISSA
PROJECT Nº: P1701	M.P.P. COMPARTMENT III	DOC. Nº: P1701- LI - 001- 3

LOOP	TAG	INSTRUMENT	SERVICE	DATA SHEET	ORIGIN	REMARKS
BIOMASS						
YT 01	YE 01 to 06 YT 01	biomass sensor biomass transmitter	bioreactor		M.P.P.	
CONDUCTIVITY						
XI 01	XE 01 XT 01	conductivity sensor conductivity transmitter	bioreactor (lower zone)	IC-HD-404	NEW	to Biomass measure system
XI 02	XE 02 XT 02	conductivity sensor conductivity transmitter	bioreactor (upper zone)	IC-HD-404	NEW	to Biomass measure system
ANALYZERS						
YT 02	YT 02	$NO2^-$ analyzer	outlet liquid phase		M.P.P.	
YT 03	YT 03	$NO3^-$ analyzer	outlet liquid phase		M.P.P.	
YT 04	YT 04	$NH4^+$ analyzer	outlet liquid phase		M.P.P.	
ANALYZERS						
ZS 01	ZS 01	position switch	bioreactor		NEW	

4. DATASHEETS

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P1701-EQ-HD-001-0
	REACTOR	Referencia : C-01
		Date: 28.04.08

Technical requisition

Project:	**P1701**	Service:	**Fermentation**		
Identifier:	**C-01**	Quantity:	**1**	Installation (inside/outside):	**Inside**

COLUMN DATA

Capacity:	**10 Litres apprx.**	Top Type:	**NEUMO Bio Connect form R + blind part form V**
Volume (working volume):	**6 Litres apprx.**	Bottom Type:	**NEUMO Bio Connect form R + blind part form V**
Thickness:	**2 mm**	Isolation:	**Yes**

Inside Diameter (mm):	**125**	Ferrule Height **1** (mm):	**480**	**Section 1**	Capacity (l): **5,88 l**
Inside Diameter (mm):	**125**	Ferrule Height **2** (mm):	**163**	**Section 2**	Capacity (l): **2 l**
Inside Diameter (mm):	**125**	Ferrule Height **3** (mm):	**163**	**Section 3**	Capacity (l): **2 l**

Fluid Nature:	**Broth (liquid+solid+gas)**
Density (kg/m3):	**1050**
Corrosion Maximum Thickness (mm):	**0 mm**
Operation Maximum Temperature (ºC):	**125 ºC** (Sterilitation with steam)
Temperature Design (ºC):	**200 ºC**
Operation Pressure (barg):	**1,2 barg**
Pressure Design (barg):	**2 barg**
Bafles:	**No**

Union of the three sections trought pairs of flanges

Flanges Type union sections 1-2 and 1-3:	**Flange form R BioConnect.**	Manufacturer:	**NEUMO or similar**
Type Flanges Bottom:	**Flange blind part form V and Flange form R BioConnect.**	Manufacturer:	**NEUMO or similar**
Type Flanges Top:	**Flange blind part form V and Flange form R BioConnect.**	Manufacturer:	**NEUMO or similar**

Polish outside:	**Ra < 0,8 µm**	Polish inside:	**Ra < 0,8 µm**
Column Material:	**AISI 316 L**	Coil Material:	**316 L**
Gaskets Material:	**PTFE**	Leg Material:	**NO**

Data Glass Spy

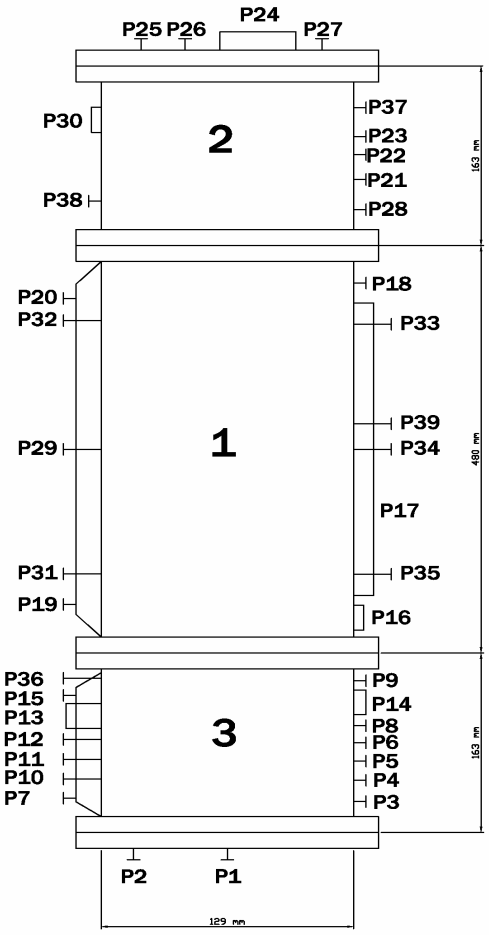
Type Spy Hole:	**Rectangular**	Manufacturer:	**Lumiglas (Papenmeier) or similar**
Lenght:	**400 mm**	Widht:	**70 mm**
Type Union:	**Welding**	Depth:	**50 mm approx.**
Operating Temperature:	**243º with Borosilicato Glass**	Operating Pressure:	**16 bar**

Data Sparger

Diameter (mm):	**65**	Orifice Nº:	**30**	Gas Flow (L/min.):	**3**
Size pipe (mm):	**6 -- 8**	Size orifice:	**2 mm**		
Material:	**AISI 316 L**				

BRANCHES						
Position	**Number**	**Service**	**DN**	**PN**	**Flanges**	**Notes**
P1	1	Connection Stirrer	DN80		FLANGE	
P2	1	Drain	DN10			DIN11850
P3	1	Connection Sparger	DN6			DIN11850
P4	1	pH Sensor	1¼"		SOCKET	INGOLD SOCKET 25/40 INCL
P5	1	Temperature Sensor	½"NPT		SOCKET	
P6	1	Dissolve Oxigen sensor	1¼"		SOCKET	INGOLD SOCKET 25/40 INCL
P7	1	Inlet Fluid Jacket	10/12		SOCKET	TUBING
P8	1	Diferential pressure Trasmitter	DN25		CLAMP	
P9	1	Inlet Recirculation	DN8		CLAMP	
P10	1	Inlet medium feed	DN8		CLAMP	
P11	1	Inlet Base	DN8		CLAMP	
P12	1	Inlet Acid	DN8		CLAMP	
P13	1	Inoculation	HOLD	HOLD	HOLD	
P14	1	Glass Spy	BIOCONTROL SIGHT GLASS S25 + WELDED BLOK FLANGE B25			
P15	1	Outlet Fluid Jacket	10/12		SOCKET	TUBING
P16	1	Bed discharge	DN40		CLAMP	
P17	1	Glass Spy	400mm RECTANGULAR SIGHT GLASS FITTING			
P18	1	Load bed	DN15		CLAMP	
P19	1	Inlet Fluid Jacket	10/12		SOCKET	TUBING
P20	1	Outlet Fluid Jacket	10/12		SOCKET	TUBING
P21	1	pH Sensor	1¼"		SOCKET	INGOLD SOCKET 25/40 INCL
P22	1	Dissolve Oxigen sensor	1¼"		SOCKET	INGOLD SOCKET 25/40 INCL
P23	1	Diferential pressure Trasmitter	DN25		CLAMP	
P24	1	Spy Hole with light	Model Series MV-S SIZE1			
P25	1	Rupture Disc	DN15		CLAMP	
P26	1	Outlet Gas	DN15		CLAMP	
P27	1	Level Transmitter and foam detector	½"		CLAMP	
P28	1	Outlet Medium and Recirculation	DN8		CLAMP	
P29	1	Biomass Transmitter	1¼"		SOCKET	INGOLD SOCKET 25/40
P30	1	Glass Spy	BIOCONTROL SIGHT GLASS S25 + WELDED BLOK FLANGE B25			
P31	1	Biomass Transmitter	1¼"		SOCKET	INGOLD SOCKET 25/40
P32	1	Biomass Transmitter	1¼"		SOCKET	INGOLD SOCKET 25/40
P33	1	Biomass Transmitter	1¼"		SOCKET	INGOLD SOCKET 25/40
P34	1	Biomass Transmitter	1¼"		SOCKET	INGOLD SOCKET 25/40
P35	1	Biomass Transmitter	1¼"		SOCKET	INGOLD SOCKET 25/40
P36	1	Conductivity Transmitter	1¼"		SOCKET	INGOLD SOCKET 25/40
P37	1	Conductivity Transmitter	1¼"		SOCKET	INGOLD SOCKET 25/40
P38	1	Temperature Transmitter	½"NPT		SOCKET	
P39	1	Temperature Transmitter	½"NPT		SOCKET	

SKETCH



Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

DATA SHEET

VESSEL

Client: MELISSA

Number: P1701-EQ-HD-003-0

Referencia : D-03

Date:

Technical requisition

Project:	P1701	Service:	Medium Feed Vessel		
Identifier:	D-03	Quantity:	1	Installation (inside/outside):	Inside

VESSEL DATA

Capacity:	33 Litres apprx.	Dome Type:	KLOPPER	Bottom Type:	KLOPPER
Volume (working volume):	30 Litres	Isolation:	YES		
Thickness:	2 mm				

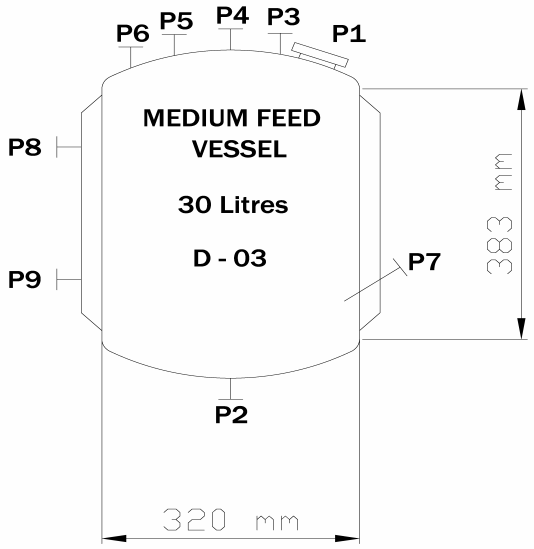
Inside Diameter (mm):	316	Cylinder Height (mm):	383	VESSEL	Cooling Jacket
Fluid Nature:				Medium	Cold Water
Density (kg/m3):				1100	1000
Polish inside:				Ra < 0,8 µm	NO
Corrosion Maximum Thickness (mm):				0	0
Operation Maximum Temperature (ºC):				130 ºC	130ºC
Temperature Design (ºC):				200 ºC	150ºC
Operation Pressure (barg):				atm	1,5
Pressure Design (barg):				3 barg	6
Bafles:				NO	NO

Polish outside:	NO	Polish inside:	Ra < 0,8 µm
Vessel Material:	AISI 316 L	Coil Material:	316 L
Gaskets Material:	PTFE	Leg Material:	304 L

BRANCHES

Position	Number	Service	DN	PN	Flanges	Notes
P1	1	Man Hole	50		CLAMP	with cap
P2	1	Drain + outlet medium	8		CLAMP	
P3	1	Venting	15		CLAMP	
P4	1	Level Indicator	½"NPT		SOCKET	(2)
P5	1	Inlet Medium	8		CLAMP	
P6	1	Rupture disc	15		CLAMP	
P7	1	Temperature Sensor	½"NPT		SOCKET	(2)
P8	1	Outlet Fluid Jacket	6		SOCKET	
P9	1	Inlet Fluid Jacket	6		SOCKET	

SKETCH and COMENTS



(1) Caps is also available
(2) To confirm

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Bsic Engineering	F.G.	18.04.08		

DATA SHEET

VESSEL

Client: MELISSA

Number: P1701-EQ-HD-004-0

Referencia : D-04

Date:

Technical requisition

Project:	**P1701**	Service:	**Medium Outlet Vessel**		
Identifier:	**D-04**	Quantity:	**1**	Installation (inside/outside):	**Inside**

VESSEL DATA

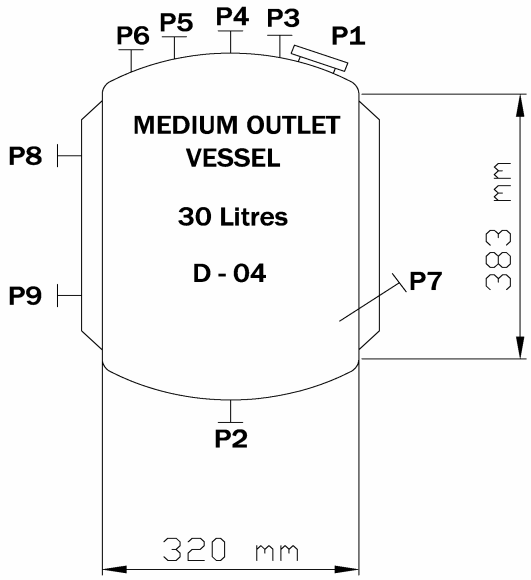
Capacity:	**33 Litres apprx.**	Dome Type:	**KLOPPER**	Bottom Type:	**KLOPPER**
Volume (working volume):	**30 Litres**	Isolation:	**YES**		
Thickness:	**2 mm**				
Inside Diameter (mm):	**316**	Cylinder Height (mm):	**383**	VESSEL	Cooling Jacket
Fluid Nature:				**FERMENTATION BROTH**	**Medium**	**Cold Water**
Density (kg/m3):				**1100**	**1000**
Polish inside:				**0,8**	**NO**
Corrosion Maximum Thickness (mm):				**0**	**0**
Operation Maximum Temperature (ºC):				**130ºC**	**130ºC**
Temperature Design (ºC):				**200ºC**	**150ºC**
Operation Pressure (barg):				**atm**	**1,5**
Pressure Design (barg):				**3**	**6**
Bafles:				**NO**	**NO**
Polish outside:	**No**			Polish inside:	**Ra < 0,8 µm**

Vessel Material:	**AISI 316 L**	Coil Material:	**316 L**
Gaskets Material:	**PTFE**	Leg Material:	**314 L**

BRANCHES

Position	Number	Service	DN	PN	Flanges	Notes
P1	1	Man Hole	**50**		**CLAMP**	
P2	1	Drain	**8**		**CLAMP**	
P3	1	Venting and Manometer	**15**		**CLAMP**	
P4	1	Level Indicator	**½" NPT**		**SOCKET**	**(2)**
P5	1	Inlet Medium	**8**		**CLAMP**	
P6	1	Rupture disc	**15**		**CLAMP**	
P7	1	Temperature Sensor	**½" NPT**		**SOCKET**	**(2)**
P8	1	Return Fluid Jacket	**6**		**SOCKET**	
P9	1	Inlet Fluid Jacket	**6**		**SOCKET**	

SKETCH and COMENTS



(1) Caps is also available
(2) To confirm

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

DATA SHEET

STIRRER

Client: MELISSA

Number: P1701-EQ-HD-002-0

Referencia : AC-01

Date: 30.04.08

Technical requisition

Project:	**P1701**	Service:	**Fermenter Mixer**
Identifier:	**AC-01**	Quantity:	**1**

	Operation Condition	Design Condition
	MIXING	**STERILITATION**
Fluid Type:	**Broth**	**Water**
Physical State:	**liquid + solid + gas**	**liquid + steam**
Quantity(L):	**10 l (2 l in mixing camera)**	**2 l**
Density (kg/m³):	**1015**	**1000**
Viscosity (cP):	**50**	**1**
Particle Size (mm):	**0,1**	
Operation Pressure (barg): **1,2**	Maximum Temperature operation (ºC): **125ºC**	Design Density (kg/m³): **1015**
Design Pressure (barg): **2**	Design Temperature (ºC): **200ºC**	Design Viscosity (cP): **50**
Liquid Level during operation: **full**		

Stirrer Data

Mobiles	Type: **Rhuston**	Number: **1**	Blade Nº: **4**	Diameter (mm): **75**
	Blade Size(mm): **20 x 15**	**see drawing**	Bottom Bearing:	**No**
Shaft	Lenght (mm): **51 approx.**	Diameter (mm): **10**	Mobil Speed:	**200 / 500 rpm (variable speed)**

Materials

Body Mixer:	**AISI 316 L**	Shaft:	**AISI 316 L**	Blade:	**AISI 316 L**
Seal: **Magnetic Drive**		Support:	**AISI 316 L**	Polish:	

Electric Motor

Manufacturer:	**ABB**	Type:		Clasification:	**No**	Gear box:	**1:3**
ElectricPower (kW):	**Estimated 100 w**	rpm: **1500**	Variable Frec.:	**20/50 Hz**	Isolation:	Protection:	**IP-55**
Voltage (V):	**220 V**	Phases: **2**	Frecuency(Hz):	**50**	Bearing:	**Yes**	

Vessel Data (down part)

Identifier:		Total Capacity (l):	**2**		
Diameter inside (mm):	**125**	Ferrule Height (mm):	**163**	Bottom height (mm):	
Flange assembly:	**see drawing**	Man Hole Size (mm):	**64**	Maximum height for dismantling (mm):	
Design Pressure (barg):	**2**	Design Temperature (ºC):	**200**	Tolerance corrosion:	

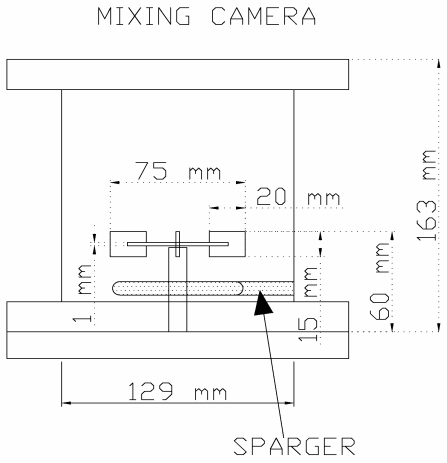
Notes

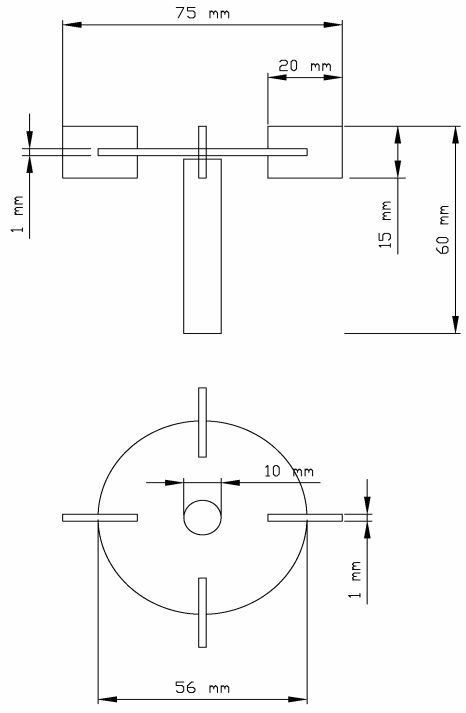
→ **Operation:** Dispersion of the gas and liquid mixture.

→ **Sterilitation:** 30 min. at 121 ºC or 1,2 barg

→ **Others**: Variable speed drive with frequency variator

SKETCH





Rev.	Description	Prep.	Date	Firm	Approval
0	Basic Engineering	C.B.A.	30.04.2008		

DATA SHEET

PLATES HEAT EXCHANGER

Client: MELISSA
Number: P1701-EQ-HD-101-1
Referencia : E-02

Technical requisition

Project:	**P1701**	Service:	**HEATING WATER**	Installation (inside/outside):	**Inside**
Identifier:	**E-02**	Quantity:	**1**	Type: **Brazing Plates**	

UNIT DATA

		SIDE 1		SIDE 2	
Fluid Nature:		**Hot Water**		**Water**	
Mass flow (kg/h):		**50**		**100**	
LIQUID	**GASES AND STEAMS**	**INLET**	**OUTLET**	**INLET**	**OUTLET**
water					
water					
		INLET	**OUTLET**	**INLET**	**OUTLET**
Temperature operation (ºC):		**50**	**40**	**30**	**35**
Pressure Operation (barg):					
Liquid	Density (kg/m3):	**989,1**		**993,6**	
Liquid	Viscosity(cP):	**0,546**	**0,654**	**0,801**	**0,721**
Liquid	Specific Heat(kcal/kg ºC):	**4,17**		**4,18**	
Liquid	Thermal Conductivity (kcal/h m ºC):	**0,636**		**0,62**	
Liquid	Surface tension (dinas/cm):				
Liquid	Evaporation point (ºC):				
Vapor	Density (kg/m3):				
Vapor	Viscosity(cP):				
Vapor	Specific Heat(kcal/kg ºC):				
Vapor	Thermal Conductivity (kcal/h m ºC):				
Vapor	ΔT/ΔP (ºC/bar):				
Vapor	Dew point (ºC):				
Velocity(m/s):					
ΔP max/ actual (bar):					
Fouling factor (m² h ºC/kcal):					
Oversized factor:		Transfer rate:		Flow:	
Heat exchanger (kcal/h):		**500**	ΔT Ln (ºC):	**12,3**	
Transfer rate (kcal/h m² ºC):			Unit calculated area (m²):		

DESIGN DATA

Pressure Design (barg):	**30**	**30**
Pressure Design 2 (barg):	**30**	**30**
Temperature Design (ºC):	**-196**	
Temperature Design 2 (ºC):	**225**	
Corrosion allowance (mm):		

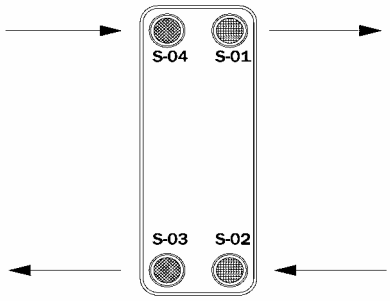
Plates material: **Alloy 316** Brazing Material: **Cu** Gaskets Material: **No**

BRANCHES

Position	Number	Service	DN	PN	Flanges		Notes
S1	1	water outlet	3/4" G				Threaded
S2	1	water inlet	3/4" G				Threaded
S3	1	hot water outlet	3/4" G				Threaded
S4	1	hot water inlet	3/4" G				Threaded

SKETCH and COMENTS

Dimensions(mm): 55 (L) x 77(W) x 207 (H)
Weights (kg): 1,16 (empty) / 1,34(full)



Rev.	Description	Prep.	Date	Firm	Approval
0	Basic Engineering	C.B.A.	28.04.2008		
1	Data Correction	C.B.A.	20.05.2008		

DATA SHEET

PLATES HEAT EXCHANGER

Client: MELISSA

Number: P1701-EQ-HD-102-1

Referencia : E-03

Technical requisition

Project:	P1701	Service:	COOLING WATER	Installation (inside/outside):	Inside
Identifier:	E-03	Quantity:	1	Type:	Brazed Plates

UNIT DATA

LIQUID	GASES AND STEAMS	SIDE 1 INLET	SIDE 1 OUTLET	SIDE 2 INLET	SIDE 2 OUTLET
water					
water					

		SIDE 1 INLET	SIDE 1 OUTLET	SIDE 2 INLET	SIDE 2 OUTLET
	Fluid Nature:	Cold Water		Water	
	Mass flow (kg/h):	50		100	
	Temperature operation (ºC):	5	15	25	20
	Pressure Operation (barg):				
Liquid	Density (kg/m3):	993,6		989,1	
Liquid	Viscosity(cP):	0,801	0,721	0,546	0,654
Liquid	Specific Heat(kcal/kg ºC):	4,18		4,17	
Liquid	Thermal Conductivity (kcal/h m ºC):	0,62		0,636	
Liquid	Surface tension (dinas/cm):				
Liquid	Evaporation point (ºC):				
Vapor	Density (kg/m3):				
Vapor	Viscosity(cP):				
Vapor	Specific Heat(kcal/kg ºC):				
Vapor	Thermal Conductivity (kcal/h m ºC):				
Vapor	ΔT/ΔP (ºC/bar):				
Vapor	Dew point (ºC):				
	Velocity(m/s):				
	ΔP max/ actual (bar):				
	Fouling factor (m² h ºC/kcal):				
	Oversized factor:	Transfer rate:		Flow:	

Heat exchanger (kcal/h):	500	ΔT_{Ln} (ºC):	12,3
Transfer rate (kcal/h m² ºC):		Unit calculated area (m²):	

DESIGN DATA

	SIDE 1	SIDE 2
Pressure Design (barg):	30	30
Pressure Design 2 (barg):	30	30
Temperature Design (ºC):	-196	
Temperature Design 2 (ºC):	225	
Corrosion allowance (mm):		

Plates material:	Alloy 316	BrazingMaterial:	Cu	Gaskets Material:	No

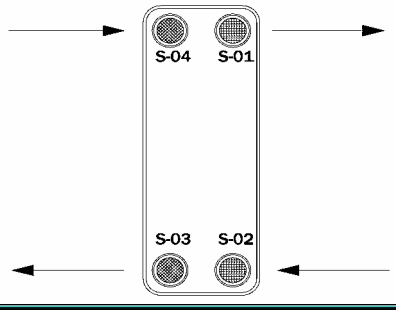
BRANCHES

Position	Number	Service	DN	PN	Flanges		Notes
S1	1	cold water outlet	3/4" G				Threaded
S2	1	cold water inlet	3/4" G				Threaded
S3	1	water outlet	3/4" G				Threaded
S4	1	water inlet	3/4" G				Threaded

SKETCH and COMENTS

Dimensions(mm): 55 (L) x 77(W) x 207 (H)

Weights (kg): 1,16 (empty) / 1,34(full)



Rev.	Description	Prep.	Date	Firm	Approval
0	Basic Engineering	C.B.A.	28.04.2008		
1	Data Correction	C.B.A.	20.05.2008		

COMPRESSOR UNIT

Item: CC-01

Number of units: 1

Installation: Indoor

Service: Gas Recirculation

Compressor Type: Diaphragm Compressor

1.- OPERATING CONDITIONS

Fluid: Outlet gas from fermenter (similar to air)

Flow rate: 3 liters/min

Working Pressure: 2 bar g

Nominal delivery: 15 liters/min at atm.pressure

Maximum operating pressure: 4 bar g

Temperature: 30 º C maximum

2.- CONSTRUCTIVE CHARACTERISTICS

100 % oil free

Materials:

Compressor head:	Aluminium or PPS
Diaphragm:	PTFE-coated
Valves:	Stainless Steel or EPDM

Electrical supply: 220/230 V – 50 Hz

Connections: ID 6 mm

Motor protection : minimum IP 20

With thermal switch and power fuse

3.- SCOPE OF SUPPLY

Supply will include the following elements:

- Compressor
- Silencer
- Pressure relief valve

4.- NOTES

With the quotation the vendor will include:

- Sketch or drawing where will be indicated all the elements included in the supply that guarantee the correct working of the unit
- Drawing with dimensions
- Technical information of the elements included in the supply

DATA SHEET

PUMP

Client:

Number: P1701-EQ-HD-301-1

Referencia : P-01

Technical requisition

Project:	**P1701**	Service:	**Broth recirculation**		
Identifier:	**P-01**	Quantity:	**1**	Installation (inside/outside):	**INSIDE**

Pump Type

Type:	**Diaphragm pump**	Couplings:	**Clamps**	Seal:	**No**
Impeller:	**Diaphragm**	Others:	**Sterile conditions**		

Materials

Bancada:	**Carbon Steel**	Body:	**AISI 316 L polished Ra ≤ 0,5**	Shaft:	**Inox**
Impeller:	**PTFE**	Gaskets:	**PTFE**	Seal:	**No**

Operation Conditions

Fluid:	**Ferment. Broth**			Suspended solid (Y/N):	**Yes**	% Weight:	**< 0,1**
Nature Solid				Particle size (µm):	**1**	ρ particle (kg/m³):	**1100**
Tª (ºC)		Normal:	**28**	Maximum:	**120**	Design:	**200**
Density (kg/m³)		Normal:	**1015**	Maximum:	**1050**	Design:	**1050**
Viscosity (cP)		Normal:	**5**	Maximum:	**50**	Design:	**50**
Pressure pumping (m.c.l.)		Normal:	**2**	Maximum:	**5**	Design:	**5**
NPSH available (m)		Normal:	**in charge**	Maximum:	—	Design:	—
Operation Flow (l/h)		Normal:	**0,9**	Maximum:	**3,6**	Design:	**4**
P maximum aspiration (m.c.l.)		Normal:	**1**	Maximum:	**12**	Design:	**20**

Design Conditions

Pressure (bar):	Temperature (ºC):	By abrasion:
By corrosion:	Others Requirements:	

Electric Motor

Manufacturer:	**ABB**	Voltage (V):	**220 V**	Phases:	**2**	Frecuency:	**50 Hz**
Zone (ATEX):	**No**	Motor Cassification:		Protection (IP):	**55**		

The following information should be enclosed to filled Data Sheet

Dimensional scheme	Characteristic curves	List spares	Maintenance plan
Test required			

To fill in by the manufacturer

Project: Mark:	Model:	Type:

Operating Data

Characteristic curveNº:		D impeller (mm):		Stages Number:		Maximum Imput Power(kW):
Operation Point	Rotacional speed (r.p.m.)		Flow (l/h)	Pressure (m.c.l.)	Power imput(kW)	η (%)	N.P.S.H. required (m.c.l.)
1	– –	– –	**0,9**		– –	– –	– –
2	– –	– –	**2,5**		– –	– –	– –
3	– –	– –	**3,6**		– –	– –	– –
	– –	– –			– –	– –	– –
Audible power (dBA):				Audible level (1 meter):			

Construction Details

Horizontal:	Vertical (minimum height boot (mm)):	Submersible (order minimum height boot(mm)):

Orifice	Size DN	Type DN	Position
Absorption	– –	– –	– –
Expulsion	– –	– –	– –

Impeller Type:	Diameter maximum impeller (mm):		
Mechanic Closure	Mark:	Kind:	Type:
Cooling:	Flow min.refrigeration (l/h):		P min.refrigeration(barg):
Bearing:	Coupling:	Lubrication/Maintenance:	

Materials

Bancada:	Section:	Shaft:
Impeller:	Gaskets:	Closure:

Electric Motor

Manufacturer:	Type:	Form:	
Potency (Kw):	r.p.m.:	Stages Number:	Frecuency:
Protections:		Classification:	

NOTES

→PUMP for working in sterile conditions during long time (months)
→Sterilitation process: steam at 1,2 barg is used and 121 ºC is rised during 30 min.
→A frequency converter would need for regulate the flow between 0,9 and 3,6 l/h. It has to be included in the scope of supply
→Detection of damaged diaphragm

Rev.	Description	Prep.	Date	Firm	Approval
0	Basic Engineering	C.B.A.	31.03.2008		
1	recirc/backwash independ.	P.G.M.	08.05.2008		

PUMP

Item: P-04

Number of units: 1

Installation: Indoor

Service: Medium feed

Pump Type: Tubing pump (peristaltic)

1.- OPERATING CONDITIONS

Fluid: Culture medium

Density: 1 kg / liter

Viscosity: 1 cP

Flow rate range: 0,150 l/h ÷ 0,600 l/h (2,5 ml/min ÷ 10 ml/min)

Maximum differential pressure: 1 bar

Temperature: 20 º C

2.- CONSTRUCTIVE CHARACTERISTICS

2 channels and 4 , 6 or 8 rollers

Variable speed

Analog interface

Potentiometer for speed setting

Electrical supply: 220/230 V – 50 Hz

Motor type : DC motor

Protection rating: IP 30

Start/Stop device

Tubing with small internal diameter (0,1 ÷ 3 mm) with 3 stop tubing.The tubes should be sterilizable.

3.- SCOPE OF SUPPLY

Supply will include the following elements:

- Pump
- Tubing Cassette

4.- NOTES

With the quotation the vendor will include:

- Sketch or drawing where will be indicated all the elements included in the supply that guarantee the correct working of the unit
- Drawing with dimensions
- Technical information of the elements included in the supply

DATA SHEET

CENTRIFUGAL PUMP

Client: MELISSA
Number: P1701-EQ-HD-303-0
Referencia : P-05
Date: 28.04.08

Technical requisition

Project:	**P1701**	Service:	**Water**		
Identifier:	**P- 05**	Quantity:	**1**	Installation (inside/outside):	**INSIDE**

Pump Type

Type:	**Centrifugal pump**	Couplings:	**(1)**	Seal:	**No**
Impeller:	**in line**	Others:			

Materials

Bancada:	**No**	Body:	**cast iron**	Shaft:	**Inox**
Impeller:	**Inox**	Gaskets:		Seal:	

Operation Conditions

Fluid:	**water**			Suspended solid (Y/N):	**N**	% Weight:	—
Nature Solid				Particle size (µm):	—	ρ particle (kg/m³):	—
Tª (ºC)	Normal:	**35**	Maximum:	**150**	Design:		**80**
Density (kg/m³)	Normal:	**1000**	Maximum:	**1000**	Design:		**1000**
Viscosity (cP)	Normal:	**1**	Maximum:	**1**	Design:		**1**
Pressure pumping (m.c.l.)	Normal:	**5**	Maximum:	**7**	Design:		**7**
NPSH available (m)	Normal:		Maximum:		Design:		
Operation Flow (l/h)	Normal:	**100**	Maximum:	**100**	Design:		**100**
P maximum aspiration (m.c.l.)	Normal:	**10**	Maximum:	**20**	Design:		**25**

Design Conditions

Pressure (bar):	**2,5**	Temperature (ºC):	**80 ºC**	Abrasion by :	
Corrosion by :		Others Requirements:			

Electric Motor

Manufacturer:		Voltage (V):	**240 V**	Phases:	**2** Frecuency: **50 Hz**
Zone (ATEX):	**No**	Motor Cassification:		Protection (IP):	**45**

The following information should be enclosed to filled Data Sheet

Dimensional scheme Y	Characteristic curves Y	List spares	Maintenance plan
Test required			

To fill in by the manufacturer

Project: Mark:	Model:	Type:

Operating Data

Characteristic curveNº:	D impeller (mm):	Stages Number:	Maximum Imput Power(kW):

Operation Point	Rotacional speed (r.p.m.)		Flow (l/h)	Pressure (m.c.l.)	Power imput (kW)	ŋ (%)	N.P.S.H. required (m.c.l.)
	– –	– –			– –	– –	– –
	– –	– –			– –	– –	– –
	– –	– –			– –	– –	– –
	– –	– –			– –	– –	– –

Audible power (dBA):	Audible level (1 meter):

Construction Details

Horizontal:	Vertical (minimum height boot (mm)):	Submersible (order minimum height boot(mm)):

Orifice	Size DN	Type DN	Position
Absorption	– –	– –	– –
Expulsion	– –	– –	– –

Impeller Type:	Diameter maximum impeller (mm):		
Mechanic Closure	Mark:	Kind:	Type:
Cooling:	Flow min.refrigeration (l/h):		P min.refrigeration(barg):
Bearing:	Coupling:	Lubrication/Maintenance:	

Materials

Bancada:	Section:	Shaft:
Impeller:	Gaskets:	Closure:

Electric Motor

Mark:	Type:	Form:	
Potency (Kw):	r.p.m.:	Stages Number:	Frecuency:
Protections:		Classificati Classification:	

NOTES

(1) to be indicated by the manufacturer

Rev.	Description	Prep.	Date	Firm	Approval
0	Basic Engineering	C.B.A.	28.04.2008		

DATA SHEET

PUMP

Client:

Number: P1701-EQ-HD-304-0

Referencia : P-01

Technical requisition

Project:	**P1701**	Service:	**Backwashing**		
Identifier:	**P-06**	Quantity:	**1**	Installation (inside/outside):	**INSIDE**

Pump Type

Type:	**Diaphragm pump**	Couplings:	**Clamps**	Seal:	**No**
Impeller:	**Diaphragm**	Others:	**Sterile conditions**		

Materials

Bancada:	**Carbon Steel**	Body:	**AISI 316 L polished Ra ≤ 0,5**	Shaft:	**Inox**
Impeller:	**PTFE**	Gaskets:	**PTFE**	Seal:	**No**

Operation Conditions

Fluid:	**Ferment. Broth**			Suspended solid (Y/N):	**Yes**	% Weight:	**< 0,1**
Nature Solid				Particle size (µm):	**1**	ρ particle (kg/m³):	**1100**
Tª (ºC)		Normal:	**28**	Maximum:	**120**	Design:	**200**
Density (kg/m³)		Normal:	**1015**	Maximum:	**1050**	Design:	**1050**
Viscosity (cP)		Normal:	**5**	Maximum:	**50**	Design:	**50**
Pressure pumping (m.c.l.)		Normal:	**2**	Maximum:	**5**	Design:	**5**
NPSH available (m)		Normal:	**in charge**	Maximum:	—	Design:	—
Operation Flow (l/h)		Normal:	**9**	Maximum:	**36**	Design:	**40**
P maximum aspiration (m.c.l.)		Normal:	**1**	Maximum:	**12**	Design:	**20**

Design Conditions

Pressure (bar):	Temperature (ºC):	By abrasion:
By corrosion:	Others Requirements:	

Electric Motor

Manufacturer:	**ABB**	Voltage (V):	**220 V**	Phases:	**2**	Frecuency:	**50 Hz**
Zone (ATEX):	**No**	Motor Cassification:		Protection (IP):	**55**		

The following information should be enclosed to filled Data Sheet

Dimensional scheme	Characteristic curves	List spares	Maintenance plan
Test required			

To fill in by the manufacturer

Project: Mark:	Model:	Type:

Operating Data

Characteristic curveNº:		D impeller (mm):		Stages Number:		Maximum Imput Power(kW):
Operation Point	Rotacional speed (r.p.m.)		Flow (l/h)	Pressure (m.c.l.)	Power imput(kW)	η (%)	N.P.S.H. required (m.c.l.)
1	– –	– –	**9,0**		– –	– –	– –
2	– –	– –	**25,0**		– –	– –	– –
3	– –	– –	**36,0**		– –	– –	– –
	– –	– –			– –	– –	– –
Audible power (dBA):				Audible level (1 meter):			

Construction Details

Horizontal:	Vertical (minimum height boot (mm)):	Submersible (order minimum height boot(mm)):

Orifice	Size DN	Type DN	Position
Absorption	– –	– –	– –
Expulsion	– –	– –	– –

Impeller Type:	Diameter maximum impeller (mm):		
Mechanic Closure	Mark:	Kind:	Type:
Cooling:	Flow min.refrigeration (l/h):		P min.refrigeration(barg):
Bearing:	Coupling:	Lubrication/Maintenance:	

Materials

Bancada:	Section:	Shaft:
Impeller:	Gaskets:	Closure:

Electric Motor

Manufacturer:	Type:	Form:	
Potency (Kw):	r.p.m.:	Stages Number:	Frecuency:
Protections:		Classification:	

NOTES

→PUMP for working in sterile conditions during long time (months)
→Sterilitation process: steam at 1,2 barg is used and 121 ºC is rised during 30 min.
→A frequency converter would need for regulate the flow between 9 and 36 l/h. It has to be included in the scope of supply
→Detection of damaged diaphragm

Rev.	Description	Prep.	Date	Firm	Approval
0	recirc/backwash independ.	P.G.M.	08.05.2008		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P701-EQ-HD-401-0
	Static Filter	Referencia : F-01
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Sterile Filtration of acid**	
Item: **F-01**	Quantity: **1**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid: **Sulphuric Acid 5%**
Flowrate / Design (kg/h): **2 kg/h**
Operating Temperature (a.C.): **20 ºC**
Operating Pressure (barg.): **1 barg**
Molecular weight: **98 uma**
Density (kg/m³): **1031,7**
Viscosity (cP): **approx. 5 cP**
Dangerous Fluid: **Corrosive**
Filter Type: **Cartridge**

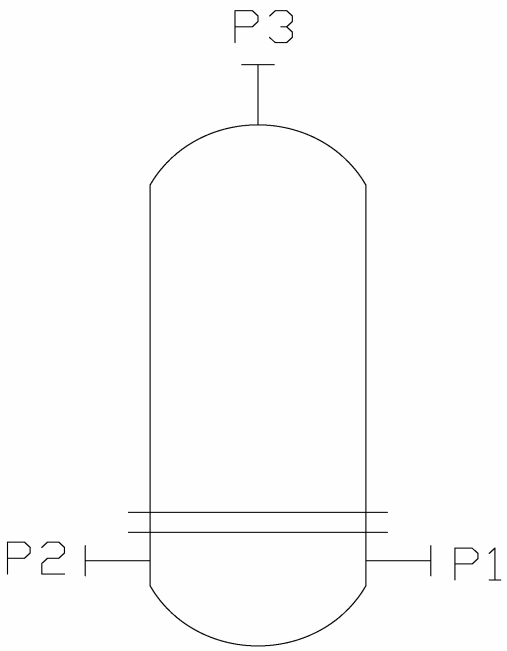
Solid Nature

Solid: **Metalic Particles + biomass**	
Flowrate (kg/h): **very low**	
Density (kg/m3): **> 2000**	
Particle Size (µm)	% Weight
> 0,5 µm	**100%**

Operating Data

ΔP Clean / Dirty (bar): **< 0,1/0,5**	
Total solid per batch (kg): **negligible**	
Partial Separation Efficiency	
Particle Size (µm)	% Weight
> 0,22 µm	**100%**

Sketch



Filter Construction Data

Filtering Medium: **Cartridge**	Type: **Membrane**	Material: **PP/PTFE**	Area (m²): **(1)**
Housing:	Type: **Housing for liquid filtration**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC): **200**		Design Pressure (barg): **> 5 barg**	
Section Material: **AISI 316 L**		Finishing: **Ra < 0,8 µ inside**	
Gaskets: **VITON**		Permissible corrosion thickness (mm): **0**	

Remarks

(1) To be indicate by the manufacturer

a.- Service. Sterile filtration of acid

b.- Cartridge with double o-ring and bayonet closure

c.- The housing is considered an integral part of providing filters.The housing can be AISI 316 L, polish inside.

d.- Sterilization with steam at 121 ºC, 1,2 barg 60 min.

e.- Manometer with accesories should be included in scope of supply

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	**1**	**inlet**	**8**			**clamp (Din 11850)**
P2	**1**	**outlet**	**8**			**clamp (Din 11850)**
P3	**1**	**Venting and Manometer**				**with accesories**

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P701-EQ-HD-402-0
	Static Filter	Referencia : F-02
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Sterile Filtration of base**	
Item: **F-02**	Quantity: **1**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid: **Sodium Carbonate (Na_2CO_3) 100 g/l**
Flowrate / Design (kg/h): **2 kg/h**
Operating Temperature (a.C.): **20 ºC**
Operating Pressure (barg.): **1 barg**
Molecular weight: **106 uma**
Density (kg/m³): **2500**
Viscosity (cP): **5 cpo**
Dangerous Fluid: **No**
Filter Type: **Cartridge**

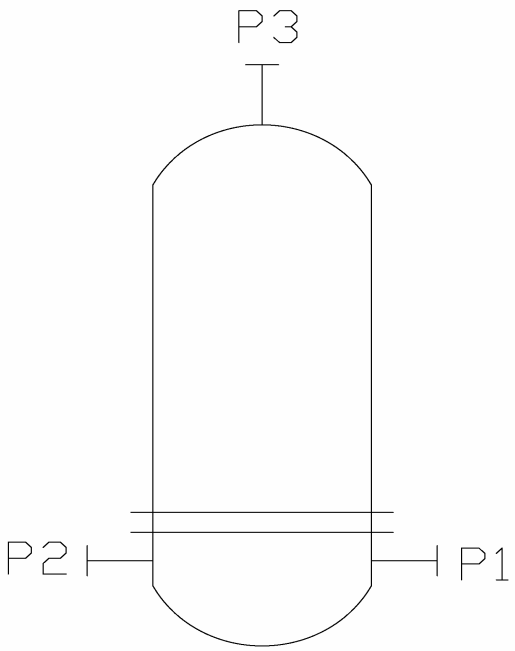
Solid Nature

Solid: **Inorganic + biomass**	
Flowrate (kg/h): **very low**	
Density (kg/m3):	
Particle Size (µm)	% Weight
> 0,5 µm	**100%**

Operating Data

ΔP Clean / Dirty (bar): **< 0,1/0,5**	
Total solid per batch (kg): **negligible**	
Partial Separation Efficiency	
Particle Size (µm)	% Weight
> 0,22 µm	**100%**

Sketch



Filter Construction Data

Filtering Medium: **Cartridge**	Type: **Membrane**	Material: **PP/PTFE**	Area (m²): **(1)**
Housing:	Type: **Housing for liquid filtration**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC): **200**		Design Pressure (barg): **> 5 barg**	
Section Material: **AISI 316 L**		Finishing: **Ra < 0,8 µ inside**	
Gaskets: **VITON**		Permissible corrosion thickness (mm): **0**	

Remarks

(1) To be indicate by the manufacturer

a.- Service. Sterile filtration of Sodium carbonate
b.- Cartridge with double o-ring and bayonet closure
c.- The housing is considered an integral part of providing filters.The housing can be AISI 316 L
d.- Sterilezation with steam at 121 ºC, 1,2 barg 60 min.
e.- Manometer with accesories should be included in scope of supply

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	**1**	**inlet**	**8**			**clamp (Din 11850)**
P2	**1**	**outlet**	**8**			**clamp (Din 11850)**
P3	**1**	**Venting and Manometer**				**with accesories**

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P701-EQ-HD-403-0
	Static Filter	Referencia : F-03
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Sterile Filtration of medium**	
Item: **F-03**	Quantity: **1**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid: **Media (water)**
Flowrate / Design (kg/h): **1 kg/h**
Operating Temperature (a.C.): **10 ºC**
Operating Pressure (barg.): **0,2 barg**
Molecular weight:
Density (kg/m³): **1050**
Viscosity (cP): **10 cpo**
Dangerous Fluid: **No**
Filter Type: **Cartridge**

Solid Nature

Solid: **biomass**
Flowrate (kg/h): **very low**
Density (kg/m3):

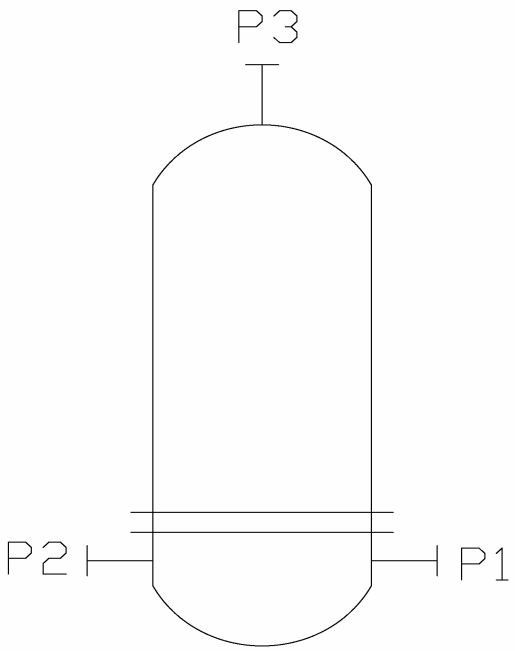
Particle Size (µm)	% Weight
> 0,22 µm	**100%**

Operating Data

ΔP Clean / Dirty (bar): **0,05 / 0,2**
Total solid per batch (kg): **negligible**
Partial Separation Efficiency

Particle Size (µm)	% Weight
> 0,22 µm	**100%**

Sketch



Filter Construction Data

Filtering Medium: **Cartridge**	Type: **Membrane**	Material: **PP/PTFE**	Area (m²): **(1)**
Housing:	Type: **Housing for liquid filtration**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC): **200**		Design Pressure (barg): **> 5 barg**	
Section Material: **AISI 316 L**		Finishing: **Ra < 0,8 µ inside**	
Gaskets: **VITON**		Permissible corrosion thickness (mm): **0**	

Remarks

(1) To be indicate by the manufacturer
a.- Service. Sterile filtration of media
b.- Cartridge with double o-ring and bayonet closure
c.- The housing is considered an integral part of providing filters.The housing can be AISI 316 L
d.- Sterilezation with steam at 121 ºC, 1,2 barg, 60 min.
e.- Manometer with accesories should be included in scope of supply

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	**1**	**inlet**	**8**			**clamp (Din 11850)**
P2	**1**	**outlet**	**8**			**clamp (Din 11850)**
P3	**1**	**Venting and Manometer**				**with accesories**

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P701-EQ-HD-404-0
	Static Filter	Referencia : F-04
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Sterile Filtration of medium load to D-03**	
Item: **F-04**	Quantity: **1**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid: **Media (water)**
Flowrate / Design (kg/h): **25 kg/h**
Operating Temperature (a.C.): **20 ºC**
Operating Pressure (barg.): **0,2 barg**
Molecular weight:
Density (kg/m³): **1050**
Viscosity (cP): **10 cpo**
Dangerous Fluid: **No**
Filter Type: **Cartridge + housing**

Solid Nature

Solid: **biomass**
Flowrate (kg/h): **very low**
Density (kg/m3):

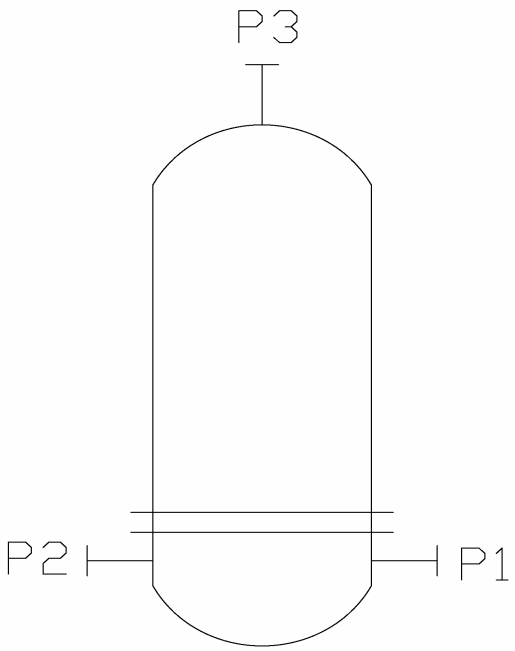
Particle Size (µm)	% Weight
> 0,22 µm	**100%**

Operating Data

ΔP Clean / Dirty (bar): **0,05 / 0,2**
Total solid per batch (kg): **negligible**
Partial Separation Efficiency

Particle Size (µm)	% Weight
> 0,22 µm	**100%**

Sketch



Filter Construction Data

Filtering Medium: **Cartridge**	Type: **Membrane**	Material: **PP/PTFE**	Area (m²): **(1)**
Housing:	Type: **Housing for liquid filtration**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC): **200**		Design Pressure (barg): **> 5 barg**	
Section Material: **AISI 316 L**		Finishing: **Ra < 0,8 µ inside**	
Gaskets: **VITON**		Permissible corrosion thickness (mm): **0**	

Remarks

(1) To be indicate by the manufacturer
a.- Service. Sterile filtration of media
b.- Cartridge with double o-ring and bayonet closure
c.- The housing is considered an integral part of providing filters.The housing can be AISI 316 L
d.- Sterilezation with steam at 121 ºC, 1,2 barg, 60 min.
e.- Manometer with accesories should be included in scope of supply

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	**1**	**inlet**	**8**			**clamp (Din 11850)**
P2	**1**	**outlet**	**8**			**clamp (Din 11850)**
P3	**1**	**Venting and Manometer**				**with accesories**

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P701-EQ-HD-405-0
	Static Filter	Referencia : F-05
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Sterile venting filter of D-03**	
Item: **F-05**	Quantity: **1**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid:	**Air**
Flowrate / Design (l/h):	**50 N l/h**
Operating Temperature (a.C.):	**20 ºC**
Operating Pressure (barg.):	**atm**
Molecular weight:	
Density (kg/m³):	**Air**
Viscosity (cP):	**Air**
Dangerous Fluid:	**No**
Filter Type:	**Vent filter**

Solid Nature

Solid:	**atmospherical powder**
Flowrate (kg/h):	**low**
Density (kg/m3):	

Particle Size (µm)	% Weight
> 0,2 µm	**100%**

Operating Data

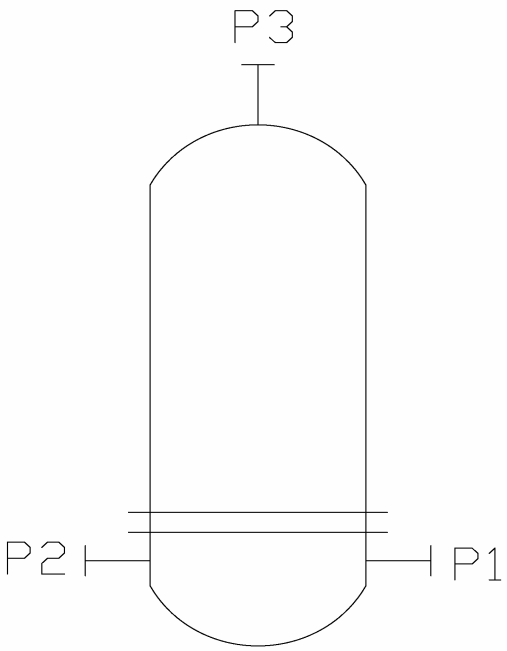
ΔP Clean / Dirty (bar): **0,01 / 0,1**

Total solid per batch (kg): **negligible**

Partial Separation Efficiency

Particle Size (µm)	% Weight
> 0,2 µm	**100%**

Sketch



Filter Construction Data

Filtering Medium: **Cartridge**	Type: **Membrane**	Material: **PP/PTFE**	Area (m²): **(1)**
Housing:	Type: **Housing vent filter**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC): **200**		Design Pressure (barg): **> 5 barg**	
Section Material: **AISI 316 L**		Finishing: **Ra < 0,8 µ**	
Gaskets: **VITON**		Permissible corrosion thickness (mm): **0**	

Remarks

(1) To be indicate by the manufacturer

a.- Service. Sterile breathing for vessel media
b.- Cartridge with double o-ring and bayonet closure
c.- The housing is considered an integral part of providing filters.The housing can be AISI 316 L
d.- Sterilezation with steam at 121 ºC, 1,2 barg, 60 min.
e.- Manometer with accesories should be included in scope of supply

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	**1**	**inlet**	**15**		**clamp**	**(Din 11850)**
P2	**1**	**outlet**	**15**		**clamp**	**(Din 11850)**
P3	**1**	**Venting and Manometer**				**with accesories**

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P701-EQ-HD-406-0
	Static Filter	Referencia : F-06 A/B
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Sterile Filtration of gas**	
Item: **F-06 A/B**	Quantity: **2**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid:	**Air**
Flowrate / Design (l/h):	**180 N l/h**
Operating Temperature (a.C.):	**28 ºC**
Operating Pressure (barg.):	**0,05 barg**
Molecular weight:	
Density (kg/m³):	**Air**
Viscosity (cP):	**Air**
Dangerous Fluid:	**No**
Filter Type:	**gas filter**

Solid Nature

Solid:	**biological**
Flowrate (kg/h):	**very low**
Density (kg/m3):	

Particle Size (µm)	% Weight
> 0,2 µm	**100%**

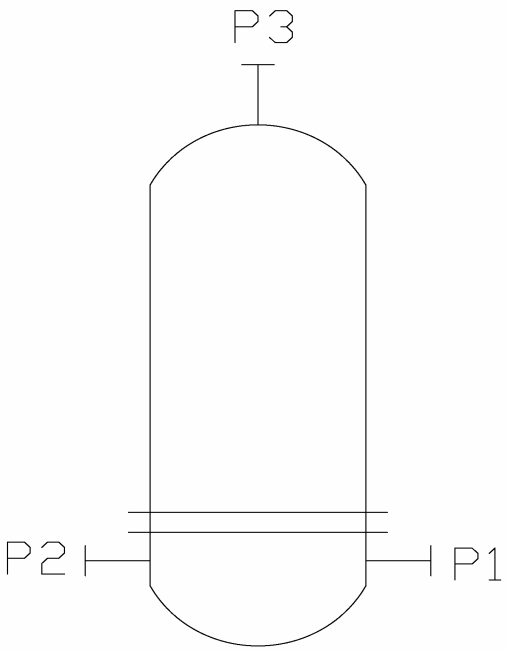
Operating Data

ΔP Clean / Dirty (bar):	**0,05/ 0,5**
Total solid per batch (kg):	**negligible**

Partial Separation Efficiency

Particle Size (µm)	% Weight
> 0,2 µm	**100%**

Sketch



Filter Construction Data

Filtering Medium: **Cartridge**	Type: **Membrane**	Material: **PP/PTFE**	Area (m²): **(1)**
Housing:	Type: **Housing for gas filters**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC): **200**		Design Pressure (barg): **> 5 barg**	
Section Material: **AISI 316 L**		Finishing: **Ra < 0,8 µ**	
Gaskets: **VITON**		Permissible corrosion thickness (mm): **0**	

Remarks

(1) To be indicate by the manufacturer

a.- Service. Sterile filtration of gas
b.- Cartridge with double o-ring and bayonet closure
c.- The housing is considered an integral part of providing filters.The housing can be AISI 316 L
d.- Sterilezation with steam at 121 ºC, 1,2 barg, 60 min.
e.- Manometer with accesories should be included in scope of supply

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	**1**	**inlet**	**6**		**no**	
P2	**1**	**outlet**	**6**		**no**	
P3	**1**	**Venting and Manometer**				**with accesories**

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P701-EQ-HD-407-0
	Static Filter	Referencia : F-07
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Sterile Filtration of compresed air**	
Item: **F-07**	Quantity: **2**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid:	**Air**
Flowrate / Design (m³/h):	**12 N m³/h**
Operating Temperature (a.C.):	**25 ºC**
Operating Pressure (barg.):	**1,5 barg**
Molecular weight:	
Dangerous Fluid:	**No**
Filter Type:	**gas filter**

Solid Nature

Solid:	**powder+biological**
Flowrate (kg/h):	**low**
Density (kg/m3):	

Particle Size (µm)	% Weight
> 0,2 µm	**100%**

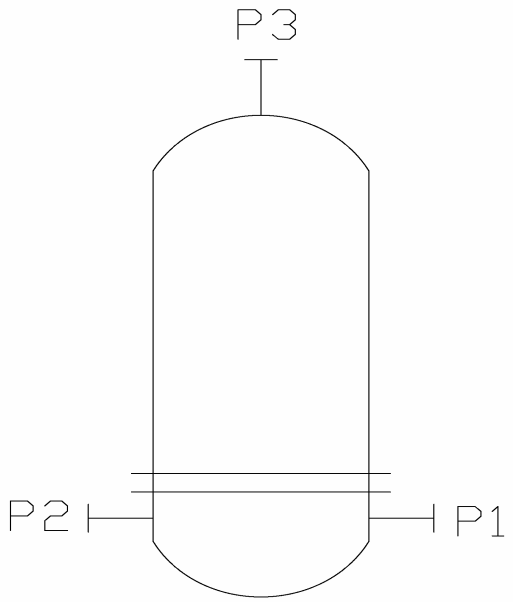
Operating Data

ΔP Clean / Dirty (bar):	**0,1/ 1**
Total solid per batch (kg):	**negligible**

Partial Separation Efficiency

Particle Size (µm)	% Weight
> 0,2 µm	**100%**

Sketch



Filter Construction Data

Filtering Medium: **Cartridge**	Type: **Membrane**	Material: **PP/PTFE**	Area (m²): **(1)**
Housing:	Type: **Housing for gas filters**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC): **200**		Design Pressure (barg): **> 5 barg**	
Section Material: **AISI 316 L**		Finishing: **Ra < 0,8 µ**	
Gaskets: **VITON**		Permissible corrosion thickness (mm): **0**	

Remarks

(1) To be indicate by the manufacturer

a.- Service.Filtration compresed air
b.- Cartridge with double o-ring and bayonet closure
c.- The housing is considered an integral part of providing filters.The housing can be AISI 316 L
d.- Sterilezation with steam at 121 ºC, 1,2 barg, 60 min.
e.- Manometer with accesories should be included in scope of supply

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	**1**	**inlet**	**15**		**no**	
P2	**1**	**outlet**	**15**		**no**	
P3	**1**	**Venting and Manometer**				**with accesories**

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P701-EQ-HD-408-0
	Static Filter	Referencia : F-08
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Sterile venting filter of D-04**	
Item: **F-08**	Quantity: **1**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid:	**Air**
Flowrate / Design (l/h):	**50 N l/h**
Operating Temperature (a.C.):	**20 ºC**
Operating Pressure (barg.):	**atm**
Molecular weight:	
Density (kg/m³):	**Air**
Viscosity (cP):	**Air**
Dangerous Fluid:	**No**
Filter Type:	**Vent filter**

Solid Nature

Solid:	**atmospherical powder**
Flowrate (kg/h):	**low**
Density (kg/m3):	

Particle Size (µm)	% Weight
> 0,2 µm	**100%**

Operating Data

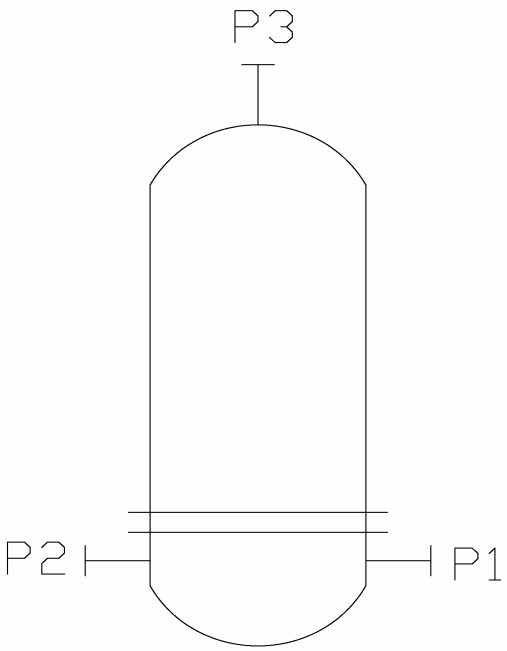
ΔP Clean / Dirty (bar): **0,01 / 0,1**

Total solid per batch (kg): **negligible**

Partial Separation Efficiency

Particle Size (µm)	% Weight
> 0,2 µm	**100%**

Sketch



Filter Construction Data

Filtering Medium: **Cartridge**	Type: **Membrane**	Material: **PP/PTFE**	Area (m²): **(1)**
Housing:	Type: **Housing vent filter**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC): **200**		Design Pressure (barg): **> 5 barg**	
Section Material: **AISI 316 L**		Finishing: **Ra < 0,8 µ**	
Gaskets: **VITON**		Permissible corrosion thickness (mm): **0**	

Remarks

(1) To be indicate by the manufacturer

a.- Service. Sterile breathing for medium outlet vessel
b.- Cartridge with double o-ring and bayonet closure
c.- The housing is considered an integral part of providing filters.The housing can be AISI 316 L
d.- Sterilezation with steam at 121 ºC, 1,2 barg, 60 min.
e.- Manometer with accesories should be included in scope of supply

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	**1**	**inlet**	**15**		**clamp**	**(Din 11850)**
P2	**1**	**outlet**	**15**		**clamp**	**(Din 11850)**
P3	**1**	**Venting and Manometer**				**with accesories**

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P701-EQ-HD-409-0
	Static Filter	Referencia : F-09 A/B
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Outlet gas filtration**	
Item: **F-09 A/B**	Quantity: **2**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid:	**Air**
Flowrate / Design (l/h):	**180 N l/h**
Operating Temperature (a.C.):	**28 ºC**
Operating Pressure (barg.):	**0,1 barg**
Molecular weight:	
Dangerous Fluid:	**No**
Filter Type:	**gas filter**

Solid Nature

Solid:	**bacilus**
Flowrate (kg/h):	**low**
Density (kg/m3):	

Particle Size (µm)	% Weight
> 1 µm	**100%**

Operating Data

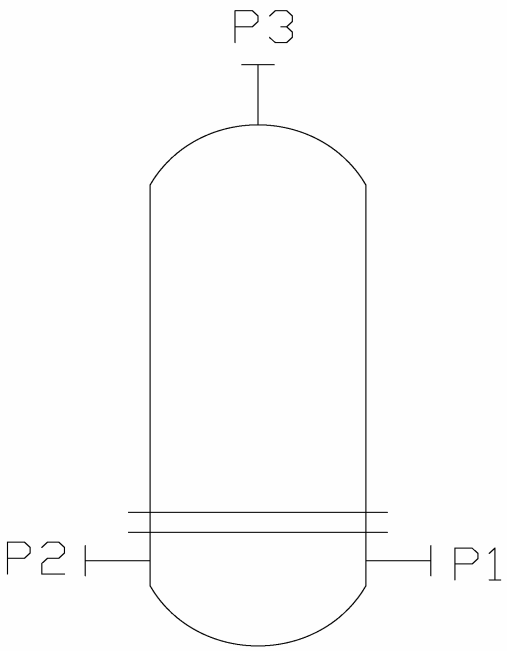
ΔP Clean / Dirty (bar): **0,01 / 0,05**

Total solid per batch (kg): **negligible**

Partial Separation Efficiency

Particle Size (µm)	% Weight
> 0,45 µm	**99%**

Sketch



Filter Construction Data

Filtering Medium: **Cartridge**	Type: **Membrane**	Material: **PP**	Area (m²): **(1)**
Housing:	Type: **Housing vent filter**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC): **200**		Design Pressure (barg): **> 5 barg**	
Section Material: **AISI 316 L**		Finishing: **Ra < 0,8 µ**	
Gaskets: **VITON**		Permissible corrosion thickness (mm): **0**	

Remarks

(1) To be indicate by the manufacturer

a.- Service. Gas filtration

b.- Cartridge with double o-ring and bayonet closure

c.- The housing is considered an integral part of providing filters.The housing can be AISI 316 L

d.- Sterilezation with steam at 121 ºC, 1,2 barg, 60 min.

e.- Manometer with accesories should be included in scope of supply

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	**1**	**inlet**	**8**		**clamp**	**(Din 11850)**
P2	**1**	**outlet**	**8**		**clamp**	**(Din 11850)**
P3	**1**	**Venting and Manometer**				**with accesories**

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P1701-IC-HD-410-0
	Static Filter	Referencia : F-10 A/B
		Date: 28.04.08

Technical requisition

Project: **P1701**	Service: **Sample Filtration**	
Identifier: **F-10 A/B**	Quantity: **2**	Installation (inside/outside): **Inside**

Fluid Nature

Fluid:	**Media (Water)**
Flowrate / Design (kg/h):	**0,2 kg/h**
Opertating Temperature (a.C.):	**28 ºC**
Opertating Pressure (barg.):	**0,05**
Molecular weight:	
Density (kg/m³):	**1100**
Viscosity (cP):	**10**
Dangerous Fluid:	**No**
Filter Type:	**liquid filter**

Solid Nature

Solid:	**bacilus**
Flowrate (g/h):	**0,2 g/h**
Density (kg/m3):	

Particle Size (µm)	% Weight
1	**100%**

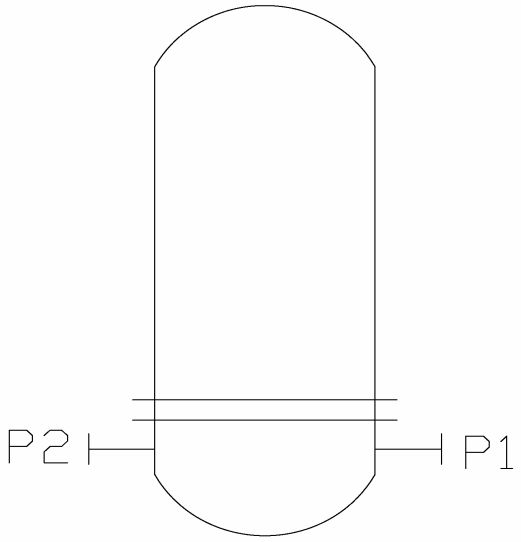
Operation Data

ΔP Clean / Dirty (bar):	**0,01 / 0,05**
Solid total per batch (g):	**20 g**

Partial Separation Efficiency

Particle Size (µm)	% Weight
1	**99%**

Sketch



Filter Construction Data

Filtering Medium **Cartbridge**	Type:	Material: **PP**	Area (m²): **(1)**
Packing:	Type: **housing for liquid filters**	Material: **AISI 316 L**	Height (m): **(1)**
Design Temperature (ºC):	**100 ºC**	Design Pressure (barg): **> 5 barg**	
Section Material:	**316 L**	Finishing **Ra<0,8µ**	
Gaskets:	**SILICONE**	Thickness of corrosion permissible (mm): **0**	

Remark

(1) To indicate the manufacturer

a.- Service. Acid Prefiltration

b.- Cartbridge with double o-ring and bayoneta closure

c.- The shell is considered an integral parts of providing filters.The shell can be AISI 316 L, polisch interiorly.

Branches

Position	Number	Service	DN	PN	Flange	Notes
P1	1	inlet	8		clamp	Din 11850
P2	1	outlet	8		clamp	Din 11851

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-001-0
	LEVEL TRANSMITTER	**Referencia : LIC-01**
		Date: 18.04.08

100	**GENERAL**	
101	Tag	**LT-01 + XA-01**
102	Cuantity	**1**
103	Section	
104	Installation	
105	Service	**Level & Foam of C-01**
106	P&I	**1701-DR-001**
107	Proposal Nº/ Order	
108	Manufacturer	**CHARISE**
109	Supplier	
110	Model Sensor	
111	Model Transmitter	
112	Remarks	**Level and Foam (2)**
200	**OPERATION DATA**	
201	Fluid	**Broth (1)**
202	State of addition	**liquid (1)**
203	Corrosives	**No**
204	Suspended Solids	**Yes**
205	Pressure Limits Mín/Máx	**0 / 1,5**
206	Temperature Limits Mín/Máx	**0 / 130 ºC**
207	Density Min/Máx	**1050**
208	Viscosity/Conductivity	**10 / cond**
209	Remarks	**sterile process (3)**
300	**PIPING/VESSEL**	
301	Nº Pipe/Vessel	**C-01**
302	Height / Diameter	**125 / 160**
303	Material	**316L**
304	Type / Bottom	**Flat**
305	Measuring point	**Top**
306	Agitation / Insulation	**No**
307	Remarks	
400	**SENSOR DATA**	
401	Sensor Type	**Inductive or Conductive**
402	Range of measurement	**160 mm**
403	Dead zone	**< 20 mm**
404	Angle of radiation	
405	Connection to Process	**1/2" TRICLAMP**
406	Material Contact with Process	**PTFE or 316**
407	Accommodation Tube Material	
408	Connection/Gaskets Material	**PTFE**
409	Measurable Flow Lim.	
410	Measurable Density Lim.	
411	Pressure Lim. Op/Max.	**1,5 bar**
412	Temperature Lim. Op/Max.	**150 ºC**
413	Electrical Classification	**NONE**
414	Protection	**IP 55**
415	Remarks	**Level and Foam (2)**

800	**CALIBRATION**	
801	4 mA	**160 mm**
802	20 mA	**20 mm**
803	Critic to process	**Yes**
804	Period of recalibration	
500	**TRANSMITTER DATA**	
501	Transmitter type	**Intelligent**
502	Communications/Protocols	**hart**
503	Analogical Outlet Signal	**4 - 20 mA**
504	Digital outputs	**1**
505	Frequency range	
506	Electrical Connection Type	**2 wires**
507	Accuracy	**≤ 1 %**
508	Electrical Supply	**24 V dc**
509	Protection	**IP 55**
510	Electrical Classification	**NONE**
511	Cover Material	**Aluminium**
512	Mounting Converter	**Remote**
513	Display type	**LCD**
514	Dimensions (h / w / d)	**by manufacturer**
600	**ACCESSORIES**	
601	Wire Sensor/Transmitter	**5 m**
602	Comunications	
603	Antenna extension	
604	Others	
900	**REMARKS**	
901	Specifications Sheet	
902	Calibration Certificate	**Yes**
903	Quality Certificate	
904	Electrical Clasif. Certificate	
905	CE Certificate	**Yes**
906	Self-Diagnosis	
907	Update time	
908	Detection empty vessel	

Notes:

(1) gas and solids in suspension

(2) continuos level plus foam detection

(3) Sterilizable with steam to 121 ºC, 1,2 bar during 30 min.

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-003-0
	LEVEL TRANSMITTER	**Referencia : LI-02**
		Date: 18.04.08

100	**GENERAL**	
101	Tag	**LT-02**
102	Cuantity	**1**
103	Section	
104	Installation	
105	Service	**D-03**
106	P&I	**1701-DR-001**
107	Proposal Nº/ Order	
108	Manufacturer	
109	Supplier	
110	Model Sensor	
111	Model Transmitter	
112	Remarks	**Level**
200	**OPERATION DATA**	
201	Fluid	**Broth**
202	State of addition	**liquid**
203	Corrosives	**no**
204	Suspended Solids	**no**
205	Pressure Limits Mín/Máx	**0 / 1,5**
206	Temperature Limits Mín/Máx	**0 / 130ºC**
207	Density Min/Máx	**1050**
208	Viscosity/Conductivity	**10 / Cond.**
209	Remarks	**(1)**
300	**PIPING/VESSEL**	
301	Nº Pipe/Vessel	**D-03**
302	Height / Diameter	**383/ 320**
303	Material	**316 L**
304	Type / Bottom	**Klopper**
305	Measuring point	**Top**
306	Agitation / Insulation	**No/ Yes**
307	Remarks	
400	**SENSOR DATA**	
401	Sensor Type	**Inductive or conduct.**
402	Range of measurement	**400 mm**
403	Dead zone	**< 50 mm**
404	Angle of radiation	
405	Connection to Process	**1/2" inch BSP**
406	Material Contact with Process	**PTFE OR 316**
407	Accommodation Tube Material	
408	Connection/Gaskets Material	**PTFE**
409	Measurable Flow Lim.	
410	Measurable Density Lim.	
411	Pressure Lim. Op/Max.	**1,5 bar**
412	Temperature Lim. Op/Max.	**150ºC (1)**
413	Electrical Classification	**NONE**
414	Protection	**IP 55**
415	Remarks	**(2)**

800	**CALIBRATION**	
801	4 mA	**400 mm / 30 litres**
802	20 mA	**50 mm / 30 litres**
803	Critic to process	**No**
804	Period of recalibration	
500	**TRANSMITTER DATA**	
501	Transmitter type	**INTELLIGENT**
502	Communications/Protocols	**Hart**
503	Analogical Outlet Signal	**4-20 mA**
504	Digital outputs	**1**
505	Frequency range	
506	Electrical Connection Type	**2 wires**
507	Accuracy	**≤ 1 %**
508	Electrical Supply	**24 V dc**
509	Protection	**IP 55**
510	Electrical Classification	**NONE**
511	Cover Material	**Aluminium**
512	Mounting Converter	**Remote**
513	Display type	**LCD**
514	Dimensions (h / w / d)	
600	**ACCESSORIES**	
601	Wire Sensor/Transmitter	**5 m**
602	Comunications	
603	Antenna extension	
604	Others	
900	**REMARKS**	
901	Specifications Sheet	
902	Calibration Certificate	**Yes**
903	Quality Certificate	
904	Electrical Clasif. Certificate	
905	CE Certificate	
906	Self-Diagnosis	
907	Update time	
908	Detection empty vessel	

Notes:

(1) Sterilizable with steam to 121 ºC, 1,2 bar during 30 min.

(2) Continuos level

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-004-0
	LEVEL TRANSMITTER	**Referencia : LI-03**
		Date: 18.04.08

100	**GENERAL**	
101	Tag	**LT-03**
102	Cuantity	**1**
103	Section	
104	Installation	
105	Service	**D-03**
106	P&I	**1701-DR-001**
107	Proposal Nº/ Order	
108	Manufacturer	
109	Supplier	
110	Model Sensor	
111	Model Transmitter	
112	Remarks	**Level**
200	**OPERATION DATA**	
201	Fluid	**Broth**
202	State of addition	**liquid**
203	Corrosives	**no**
204	Suspended Solids	**no**
205	Pressure Limits Mín/Máx	**0 / 1,5**
206	Temperature Limits Mín/Máx	**0 / 130ºC**
207	Density Min/Máx	**1050**
208	Viscosity/Conductivity	**10 / Cond.**
209	Remarks	**(1)**
300	**PIPING/VESSEL**	
301	Nº Pipe/Vessel	**D-03**
302	Height / Diameter	**383/ 320**
303	Material	**316 L**
304	Type / Bottom	**Klopper**
305	Measuring point	**Top**
306	Agitation / Insulation	**No/ Yes**
307	Remarks	
400	**SENSOR DATA**	
401	Sensor Type	**Inductive or conduct.**
402	Range of measurement	**400 mm**
403	Dead zone	**< 50 mm**
404	Angle of radiation	
405	Connection to Process	**1/2" inch BSP**
406	Material Contact with Process	**PTFE OR 316**
407	Accommodation Tube Material	
408	Connection/Gaskets Material	**PTFE**
409	Measurable Flow Lim.	
410	Measurable Density Lim.	
411	Pressure Lim. Op/Max.	**1,5 bar**
412	Temperature Lim. Op/Max.	**150ºC (1)**
413	Electrical Classification	**NONE**
414	Protection	**IP 55**
415	Remarks	**(2)**

800	**CALIBRATION**	
801	4 mA	**400 mm / 30 litres**
802	20 mA	**50 mm / 30 litres**
803	Critic to process	**No**
804	Period of recalibration	
500	**TRANSMITTER DATA**	
501	Transmitter type	**INTELLIGENT**
502	Communications/Protocols	**Hart**
503	Analogical Outlet Signal	**4-20 mA**
504	Digital outputs	**1**
505	Frequency range	
506	Electrical Connection Type	**2 wires**
507	Accuracy	**≤ 1 %**
508	Electrical Supply	**24 V dc**
509	Protection	**IP 55**
510	Electrical Classification	**NONE**
511	Cover Material	**Aluminium**
512	Mounting Converter	**Remote**
513	Display type	**LCD**
514	Dimensions (h / w / d)	
600	**ACCESSORIES**	
601	Wire Sensor/Transmitter	**5 m**
602	Comunications	
603	Antenna extension	
604	Others	
900	**REMARKS**	
901	Specifications Sheet	
902	Calibration Certificate	**Yes**
903	Quality Certificate	
904	Electrical Clasif. Certificate	
905	CE Certificate	
906	Self-Diagnosis	
907	Update time	
908	Detection empty vessel	

Notes:

(1) Sterilizable with steam to 121 ºC, 1,2 bar during 30 min.

(2) Continuos level

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	18.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-101 -0
	MASS FLOW METER	**Reference : FICQ-01**
		Date: 21.04.08

100	**GENERAL**		**500**	**TRANSMITTER DATA**	
101	Tag	**FT 01**	501	Transmitter type	**INTELLIGENT**
102	Quantity	**1**	502	Communications/Protocols	**HART / KEYBOARD**
103	Section		503	Analogical Outlet Signal	**4 : 20 mA**
104	Installation		504	Frequency Outlet Signal	
105	Service	**MEDIA FEED**	505	Frec/Lenght Pulso	
106	P&I	**1701-DR-001**	506	Electrical Connection Type	**4 wire**
107	Proposal Nº/ Order		507	Zero correction	**YES**
108	Manufacturer		508	Digital Outlets	
109	Supplier		509	Flowrate accuracy	**< 2 % Span**
110	Model (Sensor+Transm.)		510	Density accuracy	
111	Reference		511	Temperature accuracy	
112	Remarks		512	Zero Stability	
			513	Electric Supply	**220 V AC / 24 V DC**
200	**OPERATING DATA**		514	Protection	**IP 55**
201	Fluid	**BROTH**	515	Electrical Classification	**NO**
202	State of matter	**LIQUID**	516	Cover Material	**ALUMINIUM**
203	Corrosives	**NO**	517	Mounting Transmitter	**REMOTE**
204	Suspended Solids	**NO**	518	Display type	**LCD**
205	Operating Flowrate	**0,3 l/h**	519	Totalizer Indicator	**YES**
206	Flowrate Min/Max	**0,15 / 0,6 l/h**	520	Connections	
207	Operating Pressure	**0,5 barg**			
208	Operating Temperature	**28 ºC**			
209	Conductivity				
210	Density Min/Máx	**1000 / 1050 kg/m³**	**600**	**ACCESSORY**	
211	Viscosity	**5 cpo**	601	Wire Sensor/Transmitter	**YES**
212	Remarks	**steam sterilizable 121ºC/30 min**	602	Others	
300	**PIPING/VESSEL**		**800**	**CALIBRATION**	
301	Nº Pipe/Vessel	**D-03**	801	4 mA	**0 l/h**
302	Diameter/Nominal Pressure	**NW 8**	802	20 mA	**1l/h**
303	Material	**AISI 316 L**	803	Critic for process	**NO**
304	Straight stretch upstream		804	Medium Time between calibration	
305	Straight stretch downstream				
306	Orientation/Sense	**VERTICAL / UPFLOW**			
400	**SENSOR DATA**		**900**	**OBSERVATIONS**	
401	Sensor Type	**CORIOLIS**	901	Specifications Sheet	**NO**
402	Size	**AS MANUFACTURER**	902	Calibration Certificate	**YES**
403	Construction style	**STRAIGHT TUBE**	903	Quality Certificate	**YES**
404	Rating/Nominal Pressure		904	Clasif. Electric Certificate	**NO**
405	Lenght / Height		905	CE Certificate	**YES**
406	Process connection	**CLAMP NW 8**	906	Self-Diagnosis	**NO**
407	Material Contact with Process	**AISI 316**			
408	HousingTube Material				
409	Connection/Gaskets Material	**PTFE**			
410	Measurable Flow Lim.	**0,05 l/h**			
411	Measurable Density Lim.				
412	Pressure Op/Max.Lim.	**10 barg**			
413	Temperature Op/Max.Lim.	**200 ºC**			
414	Electrical Classification	**NON CLASSIFIED**			
415	Protection				

Notes:

→For this sterilitation, steam at 121ºC is flowing during 30 min.

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	P.G.M.	21.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-102 -0
	MASS FLOW METER	**Reference : FICQ-02**
		Date: 21.04.08

100	**GENERAL**	
101	Tag	**FT 02**
102	Quantity	**1**
103	Section	
104	Installation	
105	Service	**BROTH RECIRCULATION**
106	P&I	**1701-DR-001**
107	Proposal Nº/ Order	
108	Manufacturer	
109	Supplier	
110	Model (Sensor+Transm.)	
111	Reference	
112	Remarks	
200	**OPERATING DATA**	
201	Fluid	**BROTH**
202	State of matter	**LIQUID**
203	Corrosives	**NO**
204	Suspended Solids	**YES**
205	Operating Flowrate	**2 l/h**
206	Flowrate Min/Max	**0,9 l/h / 30 l/h**
207	Operating Pressure	**0,5 barg**
208	Operating Temperature	**28 ºC**
209	Conductivity	
210	Density Min/Máx	**1000 / 1050 kg/m³**
211	Viscosity	**5 cpo**
212	Remarks	**GAS (bubles) steam sterilizable 121ºC/30'**
300	**PIPING/VESSEL**	
301	Nº Pipe/Vessel	**C-01**
302	Diameter/Nominal Pressure	**NW 8**
303	Material	**AISI 316 L**
304	Straight stretch upstream	
305	Straight stretch downstream	
306	Orientation/Sense	**HORIZONTAL**
400	**SENSOR DATA**	
401	Sensor Type	**CORIOLIS**
402	Size	**AS MANUFACTURER**
403	Construction style	**STRAIGHT TUBE**
404	Rating/Nominal Pressure	
405	Lenght / Height	
406	Process connection	**CLAMP NW 8**
407	Material Contact with Process	**AISI 316**
408	HousingTube Material	
409	Connection/Gaskets Material	**PTFE**
410	Measurable Flow Lim.	**0,1 l/h**
411	Measurable Density Lim.	
412	Pressure Op/Max.Lim.	**10 barg**
413	Temperature Op/Max.Lim.	**200 ºC**
414	Electrical Classification	**NON CLASSIFIED**
415	Protection	

500	**TRANSMITTER DATA**	
501	Transmitter type	**INTELLIGENT**
502	Communications/Protocols	**HART / KEYBOARD**
503	Analogical Outlet Signal	**4 : 20 mA**
504	Frequency Outlet Signal	
505	Frec/Lenght Pulso	
506	Electrical Connection Type	**4 wire**
507	Zero correction	**YES**
508	Digital Outlets	
509	Flowrate accuracy	**< 2 % Span**
510	Density accuracy	
511	Temperature accuracy	
512	Zero Stability	
513	Electric Supply	**220 V AC / 24 V DC**
514	Protection	**IP 55**
515	Electrical Classification	**NO**
516	Cover Material	**ALUMINIUM**
517	Mounting Transmitter	**REMOTE**
518	Display type	**LCD**
519	Totalizer Indicator	**YES**
520	Connections	
600	**ACCESSORY**	
601	Wire Sensor/Transmitter	**YES**
602	Others	
800	**CALIBRATION**	
801	4 mA	**0 l/h**
802	20 mA	**50l/h**
803	Critic for process	**NO**
804	Medium Time between calibration	
900	**OBSERVATIONS**	
901	Specifications Sheet	**NO**
902	Calibration Certificate	**YES**
903	Quality Certificate	**YES**
904	Clasif. Electric Certificate	**NO**
905	CE Certificate	**YES**
906	Self-Diagnosis	**NO**

Notes:

→For this sterilitation, steam at 121 ºC is flowing during 30 min.

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	P.G.M.	21.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-103-0
	MASS FLOW METER	**Reference : FIQ-06**
		Date: 21.04.08

100	**GENERAL**	
101	Tag	**FT 06**
102	Quantity	**1**
103	Section	
104	Installation	
105	Service	**MEDIA OUTLET**
106	P&I	**1701-DR-001**
107	Proposal Nº/ Order	
108	Manufacturer	
109	Supplier	
110	Model (Sensor+Transm.)	
111	Reference	
112	Remarks	
200	**OPERATING DATA**	
201	Fluid	**BROTH**
202	State of matter	**LIQUID**
203	Corrosives	**NO**
204	Suspended Solids	**YES - 0,1%**
205	Operating Flowrate	**0,3 l/h**
206	Flowrate Min/Max	**0,15 l/h / 0,9 l/h**
207	Operating Pressure	**0,1 barg**
208	Operating Temperature	**28 ºC**
209	Conductivity	
210	Density Min/Máx	**1000 / 1050 kg/m³**
211	Viscosity	**5 cpo**
212	Remarks	**GAS (bubles) steam sterilizable 121ºC/30'**
300	**PIPING/VESSEL**	
301	Nº Pipe/Vessel	**D-04**
302	Diameter/Nominal Pressure	**NW 8**
303	Material	**AISI 316 L**
304	Straight stretch upstream	
305	Straight stretch downstream	
306	Orientation/Sense	**VERTICAL / UPFLOW**
400	**SENSOR DATA**	
401	Sensor Type	**CORIOLIS**
402	Size	**AS MANUFACTURER**
403	Construction style	**STRAIGHT TUBE**
404	Rating/Nominal Pressure	
405	Lenght / Height	
406	Process connection	**CLAMP NW 8**
407	Material Contact with Process	**AISI 316**
408	HousingTube Material	
409	Connection/Gaskets Material	**PTFE**
410	Measurable Flow Lim.	**0,05 l/h**
411	Measurable Density Lim.	
412	Pressure Op/Max.Lim.	**10 barg**
413	Temperature Op/Max.Lim.	**200 ºC**
414	Electrical Classification	**NON CLASSIFIED**
415	Protection	

500	**TRANSMITTER DATA**	
501	Transmitter type	**INTELLIGENT**
502	Communications/Protocols	**HART / KEYBOARD**
503	Analogical Outlet Signal	**4 : 20 mA**
504	Frequency Outlet Signal	
505	Frec/Lenght Pulso	
506	Electrical Connection Type	**4 wire**
507	Zero correction	**YES**
508	Digital Outlets	
509	Flowrate accuracy	**< 2 % Span**
510	Density accuracy	
511	Temperature accuracy	
512	Zero Stability	
513	Electric Supply	**220 V AC / 24 V DC**
514	Protection	**IP 55**
515	Electrical Classification	**NO**
516	Cover Material	**ALUMINIUM**
517	Mounting Transmitter	**REMOTE**
518	Display type	**LCD**
519	Totalizer Indicator	**YES**
520	Connections	
600	**ACCESSORY**	
601	Wire Sensor/Transmitter	**YES**
602	Others	
800	**CALIBRATION**	
801	4 mA	**0 l/h**
802	20 mA	**3l/h**
803	Critic for process	**NO**
804	Medium Time between calibration	
900	**OBSERVATIONS**	
901	Specifications Sheet	**NO**
902	Calibration Certificate	**YES**
903	Quality Certificate	**YES**
904	Clasif. Electric Certificate	**NO**
905	CE Certificate	**YES**
906	Self-Diagnosis	**NO**

Notes:

→For this sterilitation, steam at 121 ºC is flowing during 30 min.

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	P.G.M.	21.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-104-0
	VORTEX FLOW METER	**Reference : FIC-07**
		Date: 21.04.08

100	**GENERAL**	
101	Tag	**FT 07**
102	Quantity	**1**
103	Section	
104	Installation	
105	Service	**GAS FEED**
106	P&I	**1701-DR-001**
107	Proposal Nº/ Order	
108	Manufacturer	
109	Supplier	
110	Model (Sensor+Transm.)	
111	Reference	
112	Remarks	
200	**OPERATING DATA**	
201	Fluid	**AIR**
202	State of matter	**GAS**
203	Corrosives	**NO**
204	Suspended Solids	**NO**
205	Operating Flowrate	**3000 ml/min**
206	Flowrate Min/Max	**1000 ml/min / 5000 ml/min**
207	Operating Pressure	**0,5 barg**
208	Operating Temperature	**32 ºC**
209	Conductivity	
210	Density Min/Máx	**1000 / 1050 kg/m³**
211	Viscosity	**5 cpo**
212	Remarks	
300	**PIPING/VESSEL**	
301	Nº Pipe/Vessel	
302	Diameter/Nominal Pressure	**DN 6**
303	Material	**AISI 316 L**
304	Straight stretch upstream	
305	Straight stretch downstream	
306	Orientation/Sense	**VERTICAL / UPFLOW**
400	**SENSOR DATA**	
401	Sensor Type	**VORTEX**
402	Size	**6 mm**
403	Construction style	**COMPACT**
404	Rating/Nominal Pressure	
405	Lenght / Height	
406	Process connection	**RACORD DN6**
407	Material Contact with Process	
408	HousingTube Material	
409	Connection/Gaskets Material	
410	Measurable Flow Lim.	**300 ml/min**
411	Measurable Density Lim.	
412	Pressure Op/Max.Lim.	**5 barg**
413	Temperature Op/Max.Lim.	**100 ºC**
414	Electrical Classification	**NON CLASSIFIED**
415	Protection	**IP55**

500	**TRANSMITTER DATA**	
501	Transmitter type	**INTELLIGENT**
502	Communications/Protocols	**HART / KEYBOARD**
503	Analogical Outlet Signal	**4 : 20 mA**
504	Frequency Outlet Signal	
505	Frec/Lenght Pulse	
506	Electrical Connection Type	**4 wire**
507	Zero correction	**YES**
508	Digital Outlets	
509	Flowrate accuracy	**< 2 % Span**
510	Density accuracy	
511	Temperature accuracy	
512	Zero Stability	**1-2%**
513	Electric Supply	**220 V AC / 24 V DC**
514	Protection	**IP 55**
515	Electrical Classification	**NO**
516	Cover Material	**ALUMINIUM**
517	Mounting Transmitter	**REMOTE**
518	Display type	**LCD**
519	Totalizer Indicator	**YES**
520	Connections	
521	Filter signal	**YES**
600	**ACCESSORY**	
601	Wire Sensor/Transmitter	**YES**
602	Others	
800	**CALIBRATION**	
801	4 mA	**0 ml/min**
802	20 mA	**10000 ml/min**
803	Critic for process	**NO**
804	Medium Time between calibration	**-1**
900	**OBSERVATIONS**	
901	Specifications Sheet	**NO**
902	Calibration Certificate	**YES**
903	Quality Certificate	**YES**
904	Clasif. Electric Certificate	**NO**
905	CE Certificate	**YES**
906	Self-Diagnosis	**NO**

Notes:

→(1) To be indicated by manufacturer

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	P.G.M.	21.04.08		

DATA SHEET

pH TRANSMITTER

Client: MELISSA

Number: P1701-IC-HD-406-0

Referencia : pHT-01

Date: 28.04.08

100	**GENERAL**	
101	Tag	**pHT-01**
102	Quantity	**1**
103	Section	
104	Installation	**inside**
105	Service	**pH control C-01-down**
106	P&I	**1701-DR-001**
107	Proposal/Order Nº	
108	Manufacturer	**MT INGOLD**
109	Suplier	
110	Transmitter Model	
111	Sensor Model	
112	Remarks	
200	**OPERATION DATA**	
201	Fluid	**fermentation broh**
202	State of matter	**liquid + biomass**
203	Corrosives	
204	Suspended Solids	**YES**
205	Conductivity	
206	Operating Flowrate	
207	Operating Pressure	
208	Temp. Operation/Max.	**28ºC / 121ºC**
209	Density Min/Max	**1000 / 1050 Kg/m3**
210	Viscosity	**5 cp**
211	Remarks	**sterile conditions**
300	**PIPING/VESSEL**	
301	Vessel / Id. Pipping	**C-01**
302	Height / Diameter	
303	Material	**AISI 316 L**
304	Type / Bottom	
305	Measuring Point	**vessel wall**
400	**SENSOR DATA**	
401	Electrode Type	**liquid electrolyte**
402	Model / Manufacturer	**Inpro2000 / INGOLD**
403	Housing	**Intrac796**
404	Electrolyte	
405	Length	**250 mm**
406	Connection Process	**DN25-INGOLD socket (3)**
407	Electrode Material	**glass**
408	Conection Material	
409	Gasket Material	
410	Mounting type	
411	Temp Limit Op/Max.	
412	Pressure Limit Op/Max.	
413	Electrical clasification	**NO**
414	Protection	
415	Temp. compensation	**Pt100**
416	Remarks	**steriliz. insitu with steam**

500	**TRANSMITTER DATA**	
501	Transmitter Type	**intelligent multichannel**
502	Comunications	
503	Outlet Analogue Signal	**4-20 mA**
504	Rangeability	
505	Electrical Conection Type	**2 wires**
506	Accuracy	**< 0,5% FS**
507	Stabillty	
508	Electrical Suplied	**24 Vdc**
509	Protection	**IEC IP65**
510	Electrical Clasification	**NO**
511	Material Cover	**ss**
512	Mounting transmitter	
513	Display Type	**LCD multifunction**
514	Dimensions (h/w/d)	**(1)**
515	self calibration	**YES**
516	Self diagnosis	**YES**
517	Temp. Compensation	**YES RTD Pt100 3wires**
518	Remarks	**(2)**
600	**ACCESSORIES**	
601	Calibration system	
602	others	**Cable + (3)**
700	**CALIBRATION**	
701	4 mA	
702	20 mA	
703	Alarm	
704	Critic for process	
705	Recalibration period	
710	**CALIBRATION**	
711	4 mA	
712	20 mA	
713	Alarm	
714	Critic for process	
715	Recalibration period	
800	**REMARKS**	
801	Specification Sheet	**Yes**
802	Calibration Certificate	**Yes**
803	Quality Certificate	
804	Electrical Clasif. Certificate	
805	CE Certificate	
806	Technical documentation	**YES**
807	Installation drawings	
808	Operat./Maint. Manual	
809	Traceable curve s/NIST	

NOTES:

(1) to be indicated by the manufacturer

(2) Transmitter collects signal from pHT-01 and pHT-02

(3) INGOLD weld-in socket side-entry in vessel 40mm lenth (included in scope with blind plug and cable)

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	PGM	28.04.08		

DATA SHEET

pH TRANSMITTER

Client: MELISSA

Number: P1701-IC-HD-407-0

Referencia : pHT-02

Date: 28.04.08

100	**GENERAL**	
101	Tag	**pHT-02**
102	Quantity	**1**
103	Section	
104	Installation	**inside**
105	Service	**pH measurement C-01-up**
106	P&I	**1701-DR-001**
107	Proposal/Order Nº	
108	Manufacturer	**MT INGOLD**
109	Suplier	
110	Transmitter Model	
111	Sensor Model	
112	Remarks	
200	**OPERATION DATA**	
201	Fluid	**fermentation broh**
202	State of matter	**liquid + biomass**
203	Corrosives	
204	Suspended Solids	**YES**
205	Conductivity	
206	Operating Flowrate	
207	Operating Pressure	
208	Temp. Operation/Max.	**28ºC / 121ºC**
209	Density Min/Max	**1000 / 1050 Kg/m3**
210	Viscosity	**5 cp**
211	Remarks	**sterile conditions**
300	**PIPING/VESSEL**	
301	Vessel / Id. Pipping	**C-01**
302	Height / Diameter	
303	Material	**AISI 316 L**
304	Type / Bottom	
305	Measuring Point	**vessel wall**
400	**SENSOR DATA**	
401	Electrode Type	**liquid electrolyte**
402	Model / Manufacturer	**Inpro2000 / INGOLD**
403	Housing	**Intrac796**
404	Electrolyte	
405	Length	**250 mm**
406	Connection Process	**DN25-INGOLD socket (3)**
407	Electrode Material	**glass**
408	Conection Material	
409	Gasket Material	
410	Mounting type	
411	Temp Limit Op/Max.	
412	Pressure Limit Op/Max.	
413	Electrical clasification	**NO**
414	Protection	
415	Temp. compensation	**Pt100**
416	Remarks	**steriliz. insitu with steam**

500	**TRANSMITTER DATA**	
501	Transmitter Type	**intelligent multichannel**
502	Comunications	
503	Outlet Analogue Signal	**4-20 mA**
504	Rangeability	
505	Electrical Conection Type	**2 wires**
506	Accuracy	**< 0,5% FS**
507	Stabillty	
508	Electrical Suplied	**24 Vdc**
509	Protection	**IEC IP65**
510	Electrical Clasification	**NO**
511	Material Cover	**ss**
512	Mounting transmitter	
513	Display Type	**LCD multifunction**
514	Dimensions (h/w/d)	**(1)**
515	self calibration	**YES**
516	Self diagnosis	**YES**
517	Temp. Compensation	**YES RTD Pt100 3wires**
518	Remarks	**(2)**
600	**ACCESSORIES**	
601	Calibration system	
602	others	**Cable + (3)**
700	**CALIBRATION**	
701	4 mA	
702	20 mA	
703	Alarm	
704	Critic for process	
705	Recalibration period	
710	**CALIBRATION**	
711	4 mA	
712	20 mA	
713	Alarm	
714	Critic for process	
715	Recalibration period	
800	**REMARKS**	
801	Specification Sheet	**Yes**
802	Calibration Certificate	**Yes**
803	Quality Certificate	
804	Electrical Clasif. Certificate	
805	CE Certificate	
806	Technical documentation	**YES**
807	Installation drawings	
808	Operat./Maint. Manual	
809	Traceable curve s/NIST	

NOTES:

(1) to be indicated by the manufacturer

(2) Transmitter collects signal from pHT-01 and pHT-02

(3) INGOLD weld-in socket side-entry in vessel 40mm lenth (included in scope with blind plug and cable)

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	PGM	28.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-401-0
	Weighing Machine	**Referencia : WT-01 / WT-02**
		Date: 28.04.08

100	**GENERAL**	
101	Tag	**WT-01 / WT-02**
102	Quantity	**2**
103	Section	
104	Installation	
105	Service	
106	P&I	**P1701-DR-001**
107	Offer /Order Nº	
108	Manufacturer	
109	Model Platform/Cell	
110	Electronical model	
111	Reference	
112	Remarks	
200	**DATA OPERATION**	
201	Medium	**Product into a bottle**
202	State of matter	**Liquid**
203	Corrosive constituents	**Yes**
204	Suspended solids	**Yes**
205	Maximum weight of operation	**5 kg**
206	Net Weight	**5 kg**
207	Gross Weight	**10 kg**
208	Remarks	
300	**PIPING/VESSEL**	
301	Disposal	
302	Material	**Stainless steal 316 L**
303	Dimensions	**190mm bottle diameter**
304	Platform Location	
305	Cells Location	**Under platform**
306	Protection	**IP 65**
307	Remarks	
400	**CELL DATA**	
401	Translator Type	
402	Nominal Capacity (CN)	
403	Combined Error	
404	Accuracy / Repetibility	
405	Safety overload	
406	Extrem overload	**10%**
407	Safety lateral load	
408	Extreme lateral load	
409	Tension imput Rec/mAX	
410	Resistence Outlet/Inlet	
411	Outlet signal	**4 - 20 mA**
412	Temperature Range	**0 - 50 ºC**
413	Flexion to full load	
414	Electrical Classification	**Non classified**
415	Electrical connection	**220 V**
416	Material Cell	**Stainless steal 316 L**
417	Material couplings	**Stainless steal 316 L**
418	Protection	**IP 65**
419	Lenght wire	**5 meters**
420	Remarks	

500	**DATOS PLATAFORMA**	
501	Cells Numbers	**1**
502	Adjustment Capacity	
503	Accuracy	**0,10%**
504	Repetibility / Linearity	
505	Weighting range	**0 - 28 kg**
506	Dimensions	
507	Load module	
508	Zero/Preload/Tare	
509	Structural Material	**Stainless steal 316 L**
510	Material Platform	**Stainless steal 316 L**
511	Load module Material	**(1)**
512	Uniform load limits/Side	
513	Protection	**IP 65**
514	Electrical Classification	
515	Disposition	
516	Remarks	
600	**ELECTRICAL DATA**	
601	Type	**Microprocessor**
602	Inlet signal	
603	Outlet signal	**4 - 20 mA (Netweight)**
604	Communication	**RS232/RS422/RS485/4-20mA**
605	Indication	**Multifuncional Display**
606	Keyboard	
607	Electricity Supply	**220 V ac**
608	Protection degree	**IP 65**
609	Disposal	**Remote display**
610	Electrical Classification	
611	Box Material	**(1)**
612	Dimensions(lenght/width/hight)	
613	Room Temperature Limits	**50 ºC**
614	Control Card	
615	AutoDiagnosis	**Yes**
616	Weighing dynamic	**Yes**
617	Remarks	**Tare + Total/Subtotal**
800	**CALIBRATION**	
801	4 mA	**0 kg**
802	20 mA	**5 kg**
803	Critic to process	**Yes**
804	Recalibration Period	
900	**OBSERVATIONS**	
901	Specifications Sheet	**No**
902	Calibration Certificate	**No**
903	Quality Certificate	**Yes**
904	Electrical Clasif. Certificate	**No**
905	CE Certificate	**Yes**
906	Technical documentation	**3 copies**
907	Max. Permissible error	

Notes:

→(1) To be indicated by manufacturer

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	P.G.M	28.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-201-0
	DIFERENTIAL PRESSURE TRANSMITTER	**Referencia : DPT-01**
		Date: 18.04.08

100	**GENERAL**		**500**	**TRANSMITTER DATA**	
101	Tag	**DPT-01**	501	Transmitter Type	**INTELLIGENT**
102	Quantity	**1**	502	Comunications/Protocols	**Hart / key board**
103	Section		503	Analogical Outlet Signal	**4-20 mA**
104	InstalLation	**inside**	504	Rangeability	
105	Service		505	Electrical Conection Type	**2 wire**
106	P&I	**1701-DR-001**	506	Accuracy	**< 2 %**
107	Proposal/Order Nº		507	Stabillty	
108	Manufacturer		508	Electrical Suplied	**24 V**
109	SupPlier		509	Protection	**IP 55**
110	Model		510	Electrical Clasification	**No**
111	Model (cont.)		511	Cover Material	**Aluminium**
112	Seal/Capillary Model		512	Mounting Transmitter	**with sensor**
113	Remarks		513	Display Type	**LCD**
			514	Dimensions (h/w/d)	**(1)**
200	**OPERATION DATA**		**600**	**SEALS**	
201	Fluid	**broth**	601	Seals Nº	**2**
202	State of matter	**liquid+solid+gas**	602	Filling	
203	Corrosives	**No**	603	Seals Type	**menbrane**
204	Suspended Solids	**Yes**	604	Connection Process	**Clamp DN 25**
205	Pressure Limits Min/Max	**0 / 2 barg**	605	Connection/Chambers	**AISI 316**
206	Temp. Limits Min/Max	**10 / 130 ºC**	606	Material Membrane	**AISI 316**
207	Density Min/Max	**1050**	607	Flushing Connection	
208	Viscosity /Conductivity	**10**	608	Static Pressure Limit	**3 barg**
209	Remarks	**Sterile Conditions**	609	Options	
			700	**CAPILLARY**	
300	**PIPING/VESSEL**		601	Capillary Connection	**clamp**
301	Vessel Nº	**C-01**	602	Filling	
302	Height / Diameter	**700 / 125 mm**	603	Material Capillary	**AISI 316**
303	Material	**316 L**	604	Capillary Lenght (2)	**1,5 m**
304	Type / Bottom	**flat**			
305	Measuring Point	**side**	**800**	**CALIBRATION**	
306	Agitation / Isolation	**Yes**	801	4 mA	**0 mbar**
			802	20 mA	**250 mbar**
400	**SENSOR DATA**		803	Critical to process	**No**
401	Sensor Type	**diferential pressure**	804	Period Recalibration	**(1)**
402	Sensor Caracteristics				
403	Sensor filling	**silicone**	**900**	**OBSERVATIONS**	
404	Seal (s)	**Yes (2)**	901	Specification Sheet	**Yes**
405	Connection Process	**clamp DN 25**	902	Calibration Certificate	**Yes**
406	Material Body/Chambers		903	Quality Certificate	
407	Material Conect. / Gaskets	**316 L**	904	Electrical Clasif. Certificate	
408	Material Drain / Venting		905	CE Certificate	
409	Material Diaphragm	**AISI 316**	906	Self diagnosis	
410	Measurement range	**0 - 500 mbar**	907	Update Time	
411	Lim. Pressure Op/Max.	**0,3 / 1,3**	908	Damping	
412	Lím. Temperature Op/Max.	**28 / 135**	909		
413	Remarks	**Sterilizable with steam 121 ºC**			

NOTES:
(1) To be indicated by the manufacturer

Rev.	Description		Prep.	Date	Firm	Aprob.
0	Basic Engineering		F.G.	28.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-202-0
	PRESSURE TRANSMITTER	**Referencia : PT-02**
		Date: 28.04.08

100	**GENERAL**		**500**	**TRANSMITTER DATA**	
101	Tag	**PT-02**	501	Transmitter Type	**INTELLIGENT**
102	Quantity	**1**	502	Comunications/Protocols	**hart / keyboard**
103	Section		503	Analogical Outlet Signal	**4-20 mA**
104	Installation	**inside**	504	Rangeability	**100:01:00**
105	Service		505	Electrical Conection Type	**2 wire**
106	P&I	**1701-DR-001**	506	Accuracy	**< 1%**
107	Proposal/Order Nº		507	Stabillty	
108	Manufacturer		508	Electrical Suplied	**24 V**
109	Supplier		509	Protection	**IP 65 s/IEC**
110	Model		510	Electrical Clasification	**NO**
111	Model (cont.)		511	Cover Material	**SS**
112	Seal/Capillary Model		512	Mounting Transmitter	**with sensor**
113	Remarks		513	Display Type	**LCD**
			514	Dimensions (h/w/d)	**(1)**
200	**OPERATION DATA**		**600**	**SEAL SEPARATORS**	
201	Fluid	**Air**	601	Seal Nº	**No**
202	State of matter	**Gas**	602	Filling	
203	Corrosives	**No**	603	Seal Type	
204	Suspended Solids	**No**	604	Process Connection	
205	Pressure Limits Min/Max	**0,1 / 1**	605	Connection/Chambers	
206	Temp. Limits Min/Max	**28 / 100**	606	Material Membrane	
207	Density Min/Max		607	Connection Flushing	
208	Viscosity /Conductivity		608	Static Pressure Limit	
209	Remarks		609	Options	
			700	**CAPILLARY**	**No**
300	**PIPING/VESSEL**		601	Capillary Connection	
301	Vessel Nº / Pipping	**Pipe Dn 6**	602	Filling	
302	Height / Diameter		603	Capillary Material	
303	Material	**AISI 316 L**	604	Capillary Lenght	
304	Type / Bottom				
305	Measuring Point	**Tube**			
306	Agitation / Isolation				
400	**SENSOR DATA**		**800**	**CALIBRATION**	
401	Sensor Type	**Relative pressure**	801	4 mA	**0**
402	Sensor Caracteristics		802	20 mA	**200 mbar**
403	Sensor filling		803	Critical to process	**No**
404	Seal (s)	**No**	804	Recalibration Period	**(1)**
405	Connection Process	**1/4"NPT**			
406	Material Body/Chambers	**AISI 316**	**900**	**REMARKS**	
407	Material Conect. / Gaskets	**AISI 316 / PTFE**	901	Specification Sheet	**Yes**
408	Material Drain / Venting		902	Calibration Certificate	
409	Material Diaphragm		903	Quality Certificate	
410	Measurement range	**0 - 500 mbar**	904	Electrical Clasif. Certificate	
411	Lim. Pressure Op/Max.	**1 barg**	905	CE Certificate	
412	Lím. Temperature Op/Max.	**100ºC**	906	Self-diagnosis	
413	Remarks		907	Update Time	
			908	Damping	
			909		

NOTES:
(1) to be indicated by the manufacturer

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	28.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-203-0
	MANOMETER	**Referencia : PI-03 / PI-04 / PI-15**
		Date: 28.04.08

100	**GENERAL**		**500**	**DISPLAY DATA**	
101	Tag	**PI-03 / PI-04 / PI-15**	501	Type	
102	Quantity	**3**	502	Dimensions	**≤ 60mm**
103	Section		503	Mounting	**vertical**
104	Installation	**inside**	504	Range	**0 / 4 bar**
105	Service		505	Overpressure ind.	**NO**
106	P&I	**1701-DR-001**	506	Resolution	
107	Proposal/Order Nº		507	Class	**1% s/UNI 8293**
108	Manufacturer		508	Process Connection	**1/2"BSP M**
109	Supplier		509	Conection	**Radial**
110	Model		510	Material conection	**AISI 316**
111	Model (cont.)		511	Filling	**Gliceryne**
112	Seal/Capillary Model		512	Material housing	**AISI 316**
113	Remarks		513	Material display	**Aluminium + white back**
			514	Material hand	**black aluminium**
				Material window	**glass**
200	**OPERATION DATA**		**600**	**SEAL**	
201	Fluid	**Air or Liquid**	601	Seal Type	**membrane**
202	State of matter		602	Filling	**silicone**
203	Corrosives	**No**	603	Process Connection	**1/2"BSP M**
204	Suspended Solids	**No**	604	Instrument conection	**1/2"BSP F**
205	Pressure Limits Min/Max	**0,1 / 2**	605	Material connection	**AISI 316**
206	Temp. Limits Min/Max	**28 / 130**	606	Material Membrane	**AISI 316**
207	Density Min/Max		607	Static Pressure Limit	
208	Viscosity /Conductivity		608	Pipe Adapter	
209	Remarks		609	Remarks	
			700	**CAPILLARY**	**No**
300	**PIPING/VESSEL**		601	Capillary Connection	
301	Vessel Nº / Pipping	**D-03 / D-04 / DN8**	602	Filling	
302	Height / Diameter		603	Capillary Material	
303	Material	**AISI 316 L**	604	Capillary Lenght	
304	Type / Bottom				
305	Measuring Point	**VESSEL / VESSEL / Tube**	**800**	**ACCESSORIES**	
306	Agitation / Isolation		801	Snubber	
			802	Overpressure protect.	
400	**SENSOR DATA**		803	Flushing ring	
401	Sensor Type	**SPIRAL SPRING**	804	U-bend	
402	Material	**AISI 316**	805	Wall support	
403	Measurement range	**0 / 4 bar**	806	valve	**yes with drain**
404	Lim. Pressure Op/Max.		807	filter	
405	overpressure	**30% FS**			
406	Lím. Temperature Op/Max.		**900**	**REMARKS**	
407	Remarks		901	Specification Sheet	
			902	Calibration Certificate	
			903	CE Certificate	

NOTES:

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	PGM	28.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-204-0
	MANOMETER	**Referencia : PI-14**
		Date: 28.04.08

100	**GENERAL**	
101	Tag	**PI-14**
102	Quantity	**1**
103	Section	
104	Installation	**inside**
105	Service	
106	P&I	**1701-DR-001**
107	Proposal/Order Nº	
108	Manufacturer	
109	Supplier	
110	Model	
111	Model (cont.)	
112	Seal/Capillary Model	
113	Remarks	
200	**OPERATION DATA**	
201	Fluid	**WATER**
202	State of matter	
203	Corrosives	**No**
204	Suspended Solids	**No**
205	Pressure Limits Min/Max	**1 / 3,5 bar**
206	Temp. Limits Min/Max	**20 / 35**
207	Density Min/Max	
208	Viscosity /Conductivity	
209	Remarks	
300	**PIPING/VESSEL**	
301	Vessel Nº / Pipping	**DN12**
302	Height / Diameter	
303	Material	**AISI 316 L**
304	Type / Bottom	
305	Measuring Point	**Tube**
306	Agitation / Isolation	
400	**SENSOR DATA**	
401	Sensor Type	**SPIRAL SPRING**
402	Material	**AISI 316**
403	Measurement range	**0 / 6 bar**
404	Lim. Pressure Op/Max.	
405	overpressure	**30% FS**
406	Lím. Temperature Op/Max.	
407	Remarks	

500	**DISPLAY DATA**	
501	Type	
502	Dimensions	**≤ 60mm**
503	Mounting	**vertical**
504	Range	**0 / 6 bar**
505	Overpressure ind.	**NO**
506	Resolution	
507	Class	**1% s/UNI 8293**
508	Process Connection	**1/2"BSP M**
509	Conection	**Radial**
510	Material conection	**AISI 316**
511	Filling	**Gliceryne**
512	Material housing	**AISI 316**
513	Material display	**Aluminium + white back**
514	Material hand	**black aluminium**
	Material window	**glass**
600	**SEAL**	**NO**
601	Seal Type	
602	Filling	
603	Process Connection	
604	Instrument conection	
605	Material connection	
606	Material Membrane	
607	Static Pressure Limit	
608	Pipe Adapter	
609	Remarks	
700	**CAPILLARY**	**No**
601	Capillary Connection	
602	Filling	
603	Capillary Material	
604	Capillary Lenght	
800	**ACCESSORIES**	
801	Snubber	
802	Overpressure protect.	
803	Flushing ring	
804	U-bend	
805	Wall support	
806	valve	**yes with drain**
807	filter	
900	**REMARKS**	
901	Specification Sheet	
902	Calibration Certificate	
903	CE Certificate	

NOTES:

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	PGM	28.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-301-0
	Temperature Transmitter	**Referencia:TIC01/02/03 TI05/06**
		Date: 22.04.08

100	**GENERAL**		**400**	**APLICATION DATA**	
101	Tag	**TT-01/02/03/05/06**			
102	Quantity	**5**	411	Op. Pressure Min./Max.	**0 / 3 barg**
103	Section		412	Op.Temperature Min/Max	**0 / 140ºC**
104	Installation	**INSIDE**	413	Calibration 4 mA	**0**
105	Service		414	Calibration 20 mA	**150**
106	P&I	**1701-DR-001**	415	Recalibration Period	**(1)**
107	Purpose/Order Nº		416	Critical to process	**YES**
108	Price				
109	Manufacturer				
110	Model				
111	Reference				
112	Remarks				
200	**SENSOR DATA**		**500**	**THERMOWELL DATA**	
201	Sensor Type	**Pt-100**	501	Material	**AISI 316**
202	Sensor Reference		502	Thread inside	**SEE SENSOR DATA**
203	Sensor protection	**YES**	503	Thread outside	**SEE SENSOR DATA**
204	Material protection	**AISI 316**	504	Diameter inside	**SEE 205**
205	Protective Outside Diameter	**Max 12 mm**	505	Diameter outside	
206	Inmersion lenght	**100 mm**	506	Lenght	**100 mm**
207	Nipple Extension	**27 mm**	507	Nipple Extension	**27 mm**
208	Process connection	**1/2" NPT**			
209	Measurament Range	**-200 to 850ºC**			
210	Head Connections	**Aluminium**			
211	Measuring Point	**lateral vessel**			
212	Remarks				
300	**TRANSMITTER DATA**		**900**	**REMARKS**	
301	Transmitter Type	**Intelligent**	901	Specifications sheet	
302	Inlet Signal	**RTD Pt100 3wires**	902	Certificates:	
303	Outlet Signal	**4 - 20 mA**		Quality	
304	Electrical Conection Type	**2 wires**		Electrical clasification	
305	Accuracy	**< 0,2% span**		CE	
306	Stability	**+/- 0,1%**		Calibration	**YES**
307	Electrical Supply	**24Vdc**	903	Remote Transmitter Position	**NO**
308	Protection	**IP65**			
309	Electrical clasification	**NO**			
310	Housing Material	**Aluminium**			
311	Location	**Sensor contact box**			
312	Room Temperature Limits	**35ºC**			
313	Relative Humidity Limits	**10-50%**			
314	Min/Max. Span				
315	Digital Display	**LCD**			
316	Position				
317	Fittings	**YES**			
318	Self Calibration	**NO**			
319	Remarks				

NOTES:

(1) To be indicated by manufacturer

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	22.04.08		

Ingenieros Consultores	**DATA SHEET**	Client: MELISSA
		Number: P1701-IC-HD-302-0
	Temperature Transmitter	Referencia : TIC-04
		Date: 22.04.08

100	**GENERAL**		**400**	**APLICATION DATA**	
101	Tag	**TT-04**			
102	Quantity	**1**	411	Op. Pressure Min./Max.	**0 / 5 barg**
103	Section		412	Op.Temperature Min/Max	**0 / 100ºC**
104	Installation	**INSIDE**	413	Calibration 4 mA	**0**
105	Service		414	Calibration 20 mA	**100**
106	P&I	**1701-DR-001**	415	Recalibration Period	**(1)**
107	Purpose/Order Nº		416	Critical to process	**NO**
108	Price				
109	Manufacturer				
110	Model				
111	Reference				
112	Remarks				
200	**SENSOR DATA**		**500**	**THERMOWELL DATA**	**NO**
201	Sensor Type	**Pt-100**	501	Material	
202	Sensor Reference		502	Thread inside	
203	Sensor protection	**YES**	503	Thread outside	
204	Material protection	**AISI 316**	504	Diameter inside	
205	Protective Outside Diameter	**Max 12 mm**	505	Diameter outside	
206	Inmersion lenght	**50 mm**	506	Lenght	
207	Nipple Extension		507	Nipple Extension	
208	Process connection	**1/2" NPT**			
209	Measurament Range	**-200 to 850ºC**			
210	Head Connections	**Aluminium**			
211	Measuring Point	**pipe 10/12**			
212	Remarks				
300	**TRANSMITTER DATA**		**900**	**REMARKS**	
301	Transmitter Type	**Intelligent**	901	Specifications sheet	
302	Inlet Signal	**RTD Pt100 3wires**	902	Certificates:	
303	Outlet Signal	**4 - 20 mA**		Quality	
304	Electrical Conection Type	**2 wires**		Electrical clasification	
305	Accuracy	**< 0,5% span**		CE	
306	Stability	**+/- 0,2%**		Calibration	**YES**
307	Electrical Supply	**24Vdc**	903	Remote Transmitter Position	**NO**
308	Protection	**IP65**			
309	Electrical clasification	**NO**			
310	Housing Material	**Aluminium**			
311	Location	**Sensor contact box**			
312	Room Temperature Limits	**35ºC**			
313	Relative Humidity Limits	**10-50%**			
314	Min/Max. Span				
315	Digital Display	**LCD**			
316	Position				
317	Fittings	**YES**			
318	Self Calibration	**NO**			
319	Remarks				

NOTES:

(1) To be indicated by manufacturer

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	22.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-408-0
	DO2 TRANSMITTER	**Referencia : DO2T-01**
		Date: 28.04.08

100	**GENERAL**	
101	Tag	**DO2T-01**
102	Quantity	**1**
103	Section	
104	Installation	**inside**
105	Service	**DO2 control C-01-lower**
106	P&I	**1701-DR-001**
107	Proposal/Order Nº	
108	Manufacturer	**MT INGOLD**
109	Suplier	
110	Transmitter Model	
111	Sensor Model	
112	Remarks	
200	**OPERATION DATA**	
201	Fluid	**fermentation broh**
202	State of matter	**liquid + biomass**
203	Corrosives	
204	Suspended Solids	**YES**
205	Conductivity	
206	Operating Flowrate	
207	Operating Pressure	
208	Temp. Operation/Max.	**28ºC / 121ºC**
209	Density Min/Max	**1000 / 1050 Kg/m3**
210	Viscosity	**5 cp**
211	Remarks	**sterile conditions**
300	**PIPING/VESSEL**	
301	Vessel / Id. Pipping	**C-01 lower zone**
302	Height / Diameter	
303	Material	**AISI 316 L**
304	Type / Bottom	
305	Measuring Point	**vessel wall**
400	**SENSOR DATA**	
401	Electrode Type	**12 mm SENSOR**
402	Model / Manufacturer	**Inpro6800 / INGOLD**
403	Housing	**Intrac797M**
404	Electrolyte	
405	Length	**320 mm**
406	Connection Process	**DN25-INGOLD socket (3)**
407	Electrode Material	**AISI 316 L**
408	Conection Material	
409	Gasket Material	
410	Mounting type	
411	Temp Limit Op/Max.	
412	Pressure Limit Op/Max.	
413	Electrical clasification	**NO**
414	Protection	
415	Temp. compensation	
416	Remarks	**steriliz. insitu with steam**

500	**TRANSMITTER DATA**	
501	Transmitter Type	**intelligent multichannel**
502	Comunications	
503	Outlet Analogue Signal	**4-20 mA**
504	Rangeability	
505	Electrical Conection Type	**2 wires**
506	Accuracy	**< 0,5%inst. value**
507	Stabillty	
508	Electrical Suplied	**24 Vdc**
509	Protection	**IEC IP65**
510	Electrical Clasification	**NO**
511	Material Cover	**ss**
512	Mounting transmitter	
513	Display Type	**LCD multifunction**
514	Dimensions (h/w/d)	**(1)**
515	self calibration	**YES**
516	Self diagnosis	**YES**
517	Temp. Compensation	
518	Remarks	**(2)**
600	**ACCESSORIES**	
601	Calibration system	
602	others	**Cable + (3)**
700	**CALIBRATION**	
701	4 mA	
702	20 mA	
703	Alarm	
704	Critic for process	
705	Recalibration period	
710	**CALIBRATION**	
711	4 mA	
712	20 mA	
713	Alarm	
714	Critic for process	
715	Recalibration period	
800	**REMARKS**	
801	Specification Sheet	**Yes**
802	Calibration Certificate	**Yes**
803	Quality Certificate	
804	Electrical Clasif. Certificate	
805	CE Certificate	
806	Technical documentation	**YES**
807	Installation drawings	
808	Operat./Maint. Manual	
809	Traceable curve s/NIST	

NOTES:

(1) to be indicated by the manufacturer

(2) Transmitter collects signal from DO2T-01 and DO2T-02

(3) INGOLD weld-in socket side-entry in vessel 40mm lenth (included in scope with blind plug and cable)

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	PGM	28.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-409-0
	DO2 TRANSMITTER	**Referencia : DO2T-02**
		Date: 28.04.08

100	**GENERAL**	
101	Tag	**DO2T-02**
102	Quantity	**1**
103	Section	
104	Installation	**inside**
105	Service	**DO2 control C-01-upper**
106	P&I	**1701-DR-001**
107	Proposal/Order Nº	
108	Manufacturer	**MT INGOLD**
109	Suplier	
110	Transmitter Model	
111	Sensor Model	
112	Remarks	
200	**OPERATION DATA**	
201	Fluid	**fermentation broh**
202	State of matter	**liquid + biomass**
203	Corrosives	
204	Suspended Solids	**YES**
205	Conductivity	
206	Operating Flowrate	
207	Operating Pressure	
208	Temp. Operation/Max.	**28ºC / 121ºC**
209	Density Min/Max	**1000 / 1050 Kg/m3**
210	Viscosity	**5 cp**
211	Remarks	**sterile conditions**
300	**PIPING/VESSEL**	
301	Vessel / Id. Pipping	**C-01 upper zone**
302	Height / Diameter	
303	Material	**AISI 316 L**
304	Type / Bottom	
305	Measuring Point	**vessel wall**
400	**SENSOR DATA**	
401	Electrode Type	**12 mm SENSOR**
402	Model / Manufacturer	**Inpro6800 / INGOLD**
403	Housing	**Intrac797M**
404	Electrolyte	
405	Length	**320 mm**
406	Connection Process	**DN25-INGOLD socket (3)**
407	Electrode Material	**AISI 316 L**
408	Conection Material	
409	Gasket Material	
410	Mounting type	
411	Temp Limit Op/Max.	
412	Pressure Limit Op/Max.	
413	Electrical clasification	**NO**
414	Protection	
415	Temp. compensation	
416	Remarks	**steriliz. insitu with steam**

500	**TRANSMITTER DATA**	
501	Transmitter Type	**intelligent multichannel**
502	Comunications	
503	Outlet Analogue Signal	**4-20 mA**
504	Rangeability	
505	Electrical Conection Type	**2 wires**
506	Accuracy	**< 0,5%inst. value**
507	Stabillty	
508	Electrical Suplied	**24 Vdc**
509	Protection	**IEC IP65**
510	Electrical Clasification	**NO**
511	Material Cover	**ss**
512	Mounting transmitter	
513	Display Type	**LCD multifunction**
514	Dimensions (h/w/d)	**(1)**
515	self calibration	**YES**
516	Self diagnosis	**YES**
517	Temp. Compensation	
518	Remarks	**(2)**
600	**ACCESSORIES**	
601	Calibration system	
602	others	**Cable + (3)**
700	**CALIBRATION**	
701	4 mA	
702	20 mA	
703	Alarm	
704	Critic for process	
705	Recalibration period	
710	**CALIBRATION**	
711	4 mA	
712	20 mA	
713	Alarm	
714	Critic for process	
715	Recalibration period	
800	**REMARKS**	
801	Specification Sheet	**Yes**
802	Calibration Certificate	**Yes**
803	Quality Certificate	
804	Electrical Clasif. Certificate	
805	CE Certificate	
806	Technical documentation	**YES**
807	Installation drawings	
808	Operat./Maint. Manual	
809	Traceable curve s/NIST	

NOTES:

(1) to be indicated by the manufacturer

(2) Transmitter collects signal from DO2T-01 and DO2T-02

(3) INGOLD weld-in socket side-entry in vessel 40mm lenth (included in scope with blind plug and cable)

Rev.	Description	Prep.	Date	Firm	Aprob.
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RUPTURE DISCS

	PSV-01	PSV-02	PSV-03
Fluid	air / steam	air / steam	air / steam
Corrosive	no	no	no
Rupture Pressure	2,2 barg	3,3 barg	3,3 barg
Diameter	DN15	DN15	DN15
Install. system	clamp	clamp	clamp

7+ Ingenieros Consultores

DATA SHEET

CONDUCTIVITY TRANSMITTER

Client: MELISSA

Number: P1701-IC-HD-404-0

Referencia : XT-01 / XT-02

Date: 29.04.08

100	**GENERAL**	
101	Tag	**XT-01 / XT-02**
102	Quantity	**2**
103	Section	
104	Installation	**inside**
105	Service	**Conductivity C-01-up/down**
106	P&I	**1701-DR-001**
107	Proposal/Order Nº	
108	Manufacturer	**MT INGOLD**
109	Suplier	
110	Transmitter Model	
111	Sensor Model	
112	Remarks	
200	**OPERATION DATA**	
201	Fluid	**fermentation broh**
202	State of matter	**liquid + biomass**
203	Corrosives	
204	Suspended Solids	**YES**
205	Conductivity	
206	Operating Flowrate	
207	Operating Pressure	
208	Temp. Operation/Max.	**28ºC / 121ºC**
209	Density Min/Max	**1000 / 1050 Kg/m3**
210	Viscosity	**5 cp**
211	Remarks	**sterile conditions**
300	**PIPING/VESSEL**	
301	Vessel / Id. Pipping	**C-01**
302	Height / Diameter	
303	Material	**AISI 316 L**
304	Type / Bottom	
305	Measuring Point	**vessel wall**
400	**SENSOR DATA**	
401	Electrode Type	**4-electrode technology**
402	Model / Manufacturer	**Inpro7108-25/40-VP / INGOLD**
403	Housing	
404	Electrolyte	
405	Length	**250 mm**
406	Connection Process	**DN25-INGOLD socket (3)**
407	Electrode Material	**AISI 316**
408	Conection Material	**AISI 316**
409	Gasket Material	
410	Mounting type	
411	Temp Limit Op/Max.	
412	Pressure Limit Op/Max.	
413	Electrical clasification	**NO**
414	Protection	
415	Temp. compensation	**Pt100**
416	Remarks	**steriliz. insitu with steam**

500	**TRANSMITTER DATA**	
501	Transmitter Type	**intelligent multichannel**
502	Comunications	
503	Outlet Analogue Signal	**4-20 mA**
504	Rangeability	
505	Electrical Conection Type	**2 wires**
506	Accuracy	**< 0,5% FS**
507	Stabillty	
508	Electrical Suplied	**24 Vdc**
509	Protection	**IEC IP65**
510	Electrical Clasification	**NO**
511	Material Cover	**ss**
512	Mounting transmitter	
513	Display Type	**LCD multifunction**
514	Dimensions (h/w/d)	**(1)**
515	self calibration	**YES**
516	Self diagnosis	**YES**
517	Temp. Compensation	**YES RTD Pt100 3wires**
518	Remarks	**(2)**
600	**ACCESSORIES**	
601	Calibration system	
602	others	**Cable + (3)**
700	**CALIBRATION**	
701	4 mA	
702	20 mA	
703	Alarm	
704	Critic for process	
705	Recalibration period	
710	**CALIBRATION**	
711	4 mA	
712	20 mA	
713	Alarm	
714	Critic for process	
715	Recalibration period	
800	**REMARKS**	
801	Specification Sheet	**Yes**
802	Calibration Certificate	**Yes**
803	Quality Certificate	
804	Electrical Clasif. Certificate	
805	CE Certificate	**YES**
806	Technical documentation	**YES**
807	Installation drawings	
808	Operat./Maint. Manual	
809	Traceable curve s/NIST	

NOTES:

(1) to be indicated by the manufacturer

(2) Transmitter collects signal from XT-01 and XT-02

(3) INGOLD weld-in socket side-entry in vessel 40mm lenth (included in scope with blind plug and cable)

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	PGM	29.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-002-0
	Control Valve	**Referencia : LCV-01**
		Date: 28.04.08

100	**GENERAL**		**500**	**INTERNAL PARTS**	
101	Tag	**LCV-01**	501	Material	**Stainless Steal / PTFE**
102	Quantity	**1**	502	Diameter Seating	
103	Section		503	Material of Shutter	**(1)**
104	Installation	**Piping**	504	Material of Seat	
105	Service	**level control**	505	Material of Retention	**PTFE**
106	P&I	**1701-DR-001**	506	Material of Tree	
107	Proposal/Order Nº		507	Remarks	
108	Manufacturer				
109	Supplier				
110	Model (Sensor+Transmitter)		**600**	**POSITIONER**	
111	Reference		601	Model	**Integrated electro-pneumatical**
112	Remarks		602	Type	
			603	ByPass	
200	**DATA OPERATION**		604	Manometer	**Yes**
201	Fluid	**Broth**	605	Inlet Signal	**4 - 20 mA**
202	State of matter	**Liquid**	606	Outlet Signal	**0 - 15 psi**
203	Corrosives	**No**	607	Characteristic	
204	Suspended Solids	**Yes (0,1%)**	608	Electrical Classification	**No**
205	Flowrate Operation	**0,3 l/h**	609	Action	**Air Open**
206	Flowrate Maximum	**0,9l/h**	610	Protection	
207	Pressure Operation/Max	**0,1 bar**	611	Air Supply	
208	Pressure Drop Op./Max.	**0,07 bar**	612	Stroke / Histeresis	
209	Temperature Op./Max.	**28 / 130 ºC**	613	Electrical Connection	
210	Conductivity	—	614	Pneumatical Connection	
211	Density	**1050 kg / m³**	615	Air Consumption	
212	Viscosity	**10 Cp**	616	Cover Material	
213	Calculation Cv Op./Max.		617	Remarks	
214	Safety Coefficient	**20%**			
215	Noise level	**< 55 dbA**	**700**	**ACTUATOR**	
216	Remarks		701	Type	**Single Efect**
			702	Range / Size	
300	**PIPING/VESSEL**		703	Inlet signal	
301	Pipe/Vessel Nº	**pipe DN8**	704	Action	**Air to Close**
302	Diameter/Nominal Pressure	**NW 8**	705	Maximum allowable Differential Pressure	**5 bar**
303	Material	**AISI 316L**	706	Supply Air	
			707	Outlet Signal	**Close**
400	**BODY DATA**		708	Safety Position	
401	Size/Rating		709	Pneumatic Connection	
402	Paso / Cv	**(1)**	710	Remarks	
403	Type				
404	Material	**316**	**800**	**ACCESORIES**	
405	Connections	**Clamp NW 8**	801	Manual Controls	**Yes**
406	Tightness	**ANSI VI**	802	Filter/Regulator	**Yes**
407	Seal	**PTFE**	801	Manometer	**Yes**
408	Lenght (Carrete/Valve)		802	Others	
409	Fluid tends to	**open**			
410	Temperature Limits	**150ºC**	**900**	**OBSERVATIONS**	
411	Pressure Limits	**3 bar**	901	Specifications Sheet	
412	Remarks	**Sanitary**	902	Calibration Certificate	**Yes**
			903	Quality Certificate	**Yes**
			904	Electrical Class. Certificate	
			905	CE Certificate	**Yes**

NOTES:
(1) to be indicated by the manufacturer

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	28.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-105-0
	Control Valve	**Referencia : FCV-07**
		Date: 28.04.08

100	**GENERAL**	
101	Tag	**FCV- 07**
102	Quantity	**1**
103	Section	
104	Installation	**Piping**
105	Service	**Air Flow control**
106	P&I	**1701-DR-001**
107	Proposal/Order Nº	
108	Manufacturer	
109	Supplier	
110	Model	
111	Reference	
112	Remarks	
200	**DATA OPERATION**	
201	Fluid	**Water**
202	State of matter	**Liquid**
203	Corrosives	**No**
204	Suspended Solids	**No**
205	Flowrate Operation	**50 l/h**
206	Flowrate Maximum	**100 l/h**
207	Pressure Operation/Max	**2**
208	Pressure Drop Op./Max.	**0,5 / 1**
209	Temperature Op./Max.	**0 / 25**
210	Conductivity	
211	Density	**1000**
212	Viscosity	**1**
213	Calculation Cv Op./Max.	
214	Safety Coefficient	**10%**
215	Noise level	**< 60 dbA**
216	Remarks	
300	**PIPING/VESSEL**	
301	Pipe/Vessel Nº	**pipe**
302	Diameter/Nominal Pressure	**DN 10**
303	Material	**AISI 316L**
400	**BODY DATA**	
401	Size/Rating	
402	Paso / Cv	**(1)**
403	Type	
404	Material	**Stainless Steal**
405	Connections	**racord DN 6**
406	Tightness	**ANSI V**
407	Seal	**PTFE**
408	Lenght (Carrete/Valve)	
409	Fluid	**Open**
410	Temperature Limits	**100 ºC**
411	Pressure Limits	**3 bar**
412	Remarks	

500	**INTERNAL PARTS**	
501	Material	**Stainless Stea l / PTFE**
502	Diameter Seating	
503	Material of Shutter	**(1)**
504	Material of Seating	
505	Material of Retention	
506	Material of Tree	
507	Remarks	
600	**POSITIONER**	
601	Model	**Integrated electro-pneumatical**
602	Type	
603	ByPass	
604	Manometer	**Yes**
605	Inlet Signal	**4 - 20 mA**
606	Outlet Signal	**0 - 15 psi**
607	Characteristic	
608	Electrical Classification	**No**
609	Action	**Direct**
610	Protection	
611	Air Supply	
612	Stroke / Hist	
613	Electrical Connection	
614	Pneumatical Connection	
615	Air Consumption	
616	Cover Material	
617	Remarks	
700	**ACTUATOR**	
701	Type	**Single efect**
702	Range / Size	
703	Inlet signal	
704	Action	**Air Close**
705	Maximum allowable Differential Pressure	
706	Supply Air	**5 bar**
707	Outlet Signal	
708	Safety Position	**Open**
709	Pneumatic Connection	
710	Remarks	
800	**ACCESORIES**	
801	Manual Controls	**Yes**
802	Filter/Regulator	**Yes**
801	Manometer	**Yes**
802	Others	
900	**REMARKS**	
901	Specifications Sheet	
902	Calibration Certificate	**Yes**
903	Quality Certificate	**Yes**
904	Electrical Class. Certificate	
905	CE Certificate	**Yes**

NOTES:

(1) to be indicated by the manufacturer

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	28.04.08		

7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-305-0
	Control Valve	**Referencia : TCV-04 A**
		Date: 28.04.08

100	**GENERAL**		**500**	**INTERNAL PARTS**	
101	Tag	**TCV-04 A**	501	Material	**(1)**
102	Quantity	**1**	502	Diameter Seating	
103	Section		503	Material of Shutter	
104	Installation		504	Material of Seating	**(1)**
105	Service	**Hot water**	505	Material of Retention	
106	P&I	**1701-DR-001**	506	Material of Tree	
107	Proposal/Order Nº		507	Remarks	
108	Manufacturer				
109	Supplier				
110	Model (Sensor+Transmitter)		**600**	**POSITIONER**	
111	Reference		601	Model	**Integrated electro-pneumatical**
112	Remarks		602	Type	
			603	ByPass	
200	**DATA OPERATION**		604	Manometer	**Yes**
201	Fluid	**Water**	605	Inlet Signal	**12 - 20 mA**
202	State of matter	**Liquid**	606	Outlet Signal	**0 - 15 psi**
203	Corrosives	**No**	607	Characteristic	
204	Suspended Solids	**No**	608	Electrical Classification	**No**
205	Flowrate Operation	**50 l/h**	609	Action	**direct**
206	Flowrate Maximum	**100 l/h**	610	Protection	**IP 55**
207	Pressure Operation/Max	**2,5 bar**	611	Air Supply	
208	Pressure Drop Op./Max.	**0,5 / 1**	612	Stroke / Hist	
209	Temperature Op./Max.	**50 / 75**	613	Electrical Connection	
210	Conductivity	**–**	614	Pneumatical Connection	
211	Density	**1000**	615	Air Consumption	
212	Viscosity	**1**	616	Cover Material	
213	Calculation Cv Op./Max.		617	Remarks	
214	Safety Coefficient	**10%**			
215	Noise level	**< 60 dbA**	**700**	**ACTUATOR**	
216	Remarks		701	Type	**Single efect**
			702	Range / Size	
300	**PIPING/VESSEL**		703	Inlet signal	
301	Pipe/Vessel Nº		704	Action	**Air close**
302	Diameter/Nominal Pressure	**DN 10**	705	Maximum allowable Differential Pressure	
303	Material		706	Air Supply	**5 bar**
			707	Outlet Signal	
400	**SECTION DATA**		708	Safety Position	**Close**
401	Size/Rating	**DN 10**	709	Pneumatic Connection	
402	Paso / Cv	**(1)**	710	Remarks	
403	Type				
404	Material	**Stainless steel**	**800**	**ACCESORIES**	
405	Connections	**racord DN 10**	801	Manual Controls	**Yes**
406	Tightness	**ANSI VI**	802	Filter/Regulator	**Yes**
407	Seal	**(1)**	801	Manometer	**Yes**
408	Lenght (Carrete/Valve)		802	Others	
409	Temperature Limits	**100 ºC**			
410	Pressure Limits	**5 bar**	**900**	**REMARKS**	
411	Remarks		901	Specifications Sheet	
			902	Calibration Certificate	
			903	Quality Certificate	
			904	Electrical Class. Certificate	
			905	CE Certificate	**Yes**

NOTES:
(1) to be indicated by the manufacturer

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G	28.04.08		

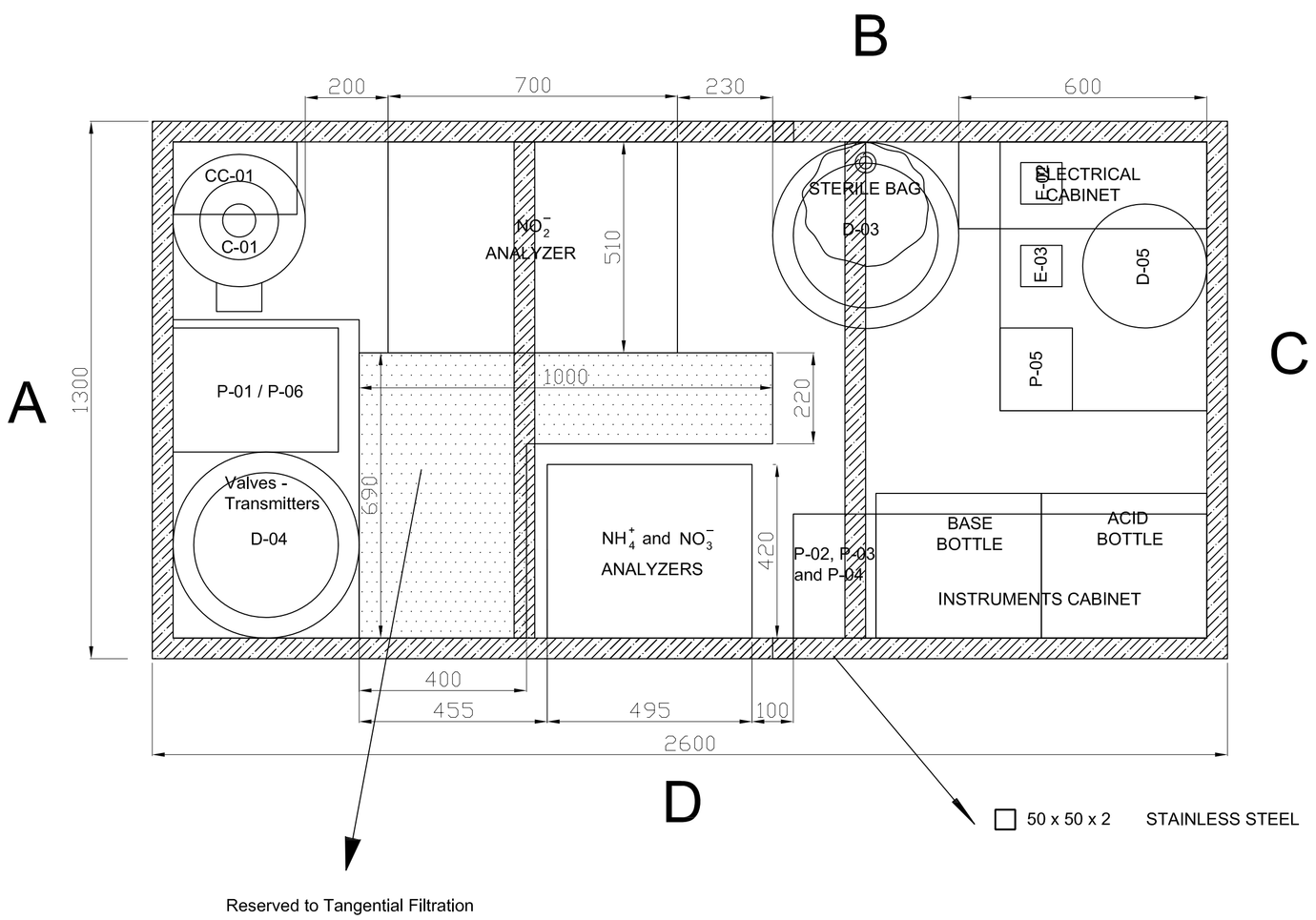
7+ Ingenieros Consultores	**DATA SHEET**	**Client:** MELISSA
		Number: P1701-IC-HD-306-0
	Control Valve	**Referencia : TCV-04 B**
		Date: 28.04.08

100	**GENERAL**		**500**	**INTERNAL PARTS**	
101	Tag	**TCV- 04 B**	501	Material	**(1)**
102	Quantity	**1**	502	Diameter Seating	
103	Section		503	Material of Shutter	
104	Installation		504	Material of Seating	**(1)**
105	Service	**Cold Water**	505	Material of Retention	
106	P&I	**1701-DR-001**	506	Material of Tree	
107	Proposal/Order Nº		507	Remarks	
108	Manufacturer				
109	Supplier				
110	Model (Sensor+Transmitter)		**600**	**POSITIONER**	
111	Reference		601	Model	**Integrated electro-pneumatical**
112	Remarks		602	Type	
			603	ByPass	
200	**DATA OPERATION**		604	Manometer	**Yes**
201	Fluid	**Water**	605	Inlet Signal	
202	State of matter	**Liquid**	606	Outlet Signal	**12 - 4 mA**
203	Corrosives	**No**	607	Characteristic	**0 - 15psi**
204	Suspended Solids	**No**	608	Electrical Classification	**No**
205	Flowrate Operation	**50 l/h**	609	Action	**Inverse**
206	Flowrate Maximum	**100 l/h**	610	Protection	**IP 55**
207	Pressure Operation/Max	**2**	611	Air Supply	
208	Pressure Drop Op./Max.	**0,5 / 1**	612	Stroke / Hist	
209	Temperature Op./Max.	**0 / 25**	613	Electrical Connection	
210	Conductivity		614	Pneumatical Connection	
211	Density	**1000**	615	Air Consumption	
212	Viscosity	**1**	616	Cover Material	
213	Calculation Cv Op./Max.		617	Remarks	
214	Safety Coefficient	**10%**			
215	Noise level	**< 60 dbA**	**700**	**ACTUATOR**	
216	Remarks		701	Type	**Single efect**
			702	Range / Size	
300	**PIPING/VESSEL**		703	Inlet signal	
301	Pipe/Vessel Nº		704	Action	**Air Close**
302	Diameter/Nominal Pressure	**DN 10**	705	Maximum allowable Differential Pressure	
303	Material		706	Air Supply	**5 bar**
			707	Outlet Signal	
400	**SECTION DATA**		708	Safety Position	**Close**
401	Size/Rating	**DN 10**	709	Pneumatic Connection	
402	Paso / Cv	**(1)**	710	Remarks	
403	Type				
404	Material	**Stainless Steal**	**800**	**ACCESORIES**	
405	Connections	**racord DN 10**	801	Manual Controls	**Yes**
406	Tightness	**ANSI VI**	802	Filter/Regulator	**Yes**
407	Seal	**(1)**	801	Manometer	**Yes**
408	Lenght (Carrete/Valve)		802	Others	
409	Temperature Limits	**100 ºC**			
410	Pressure Limits	**5 bar**	**900**	**OBSERVATIONS**	
411	Remarks		901	Specifications Sheet	
			902	Calibration Certificate	
			903	Quality Certificate	
			904	Electrical Class. Certificate	
			905	CE Certificate	**Yes**

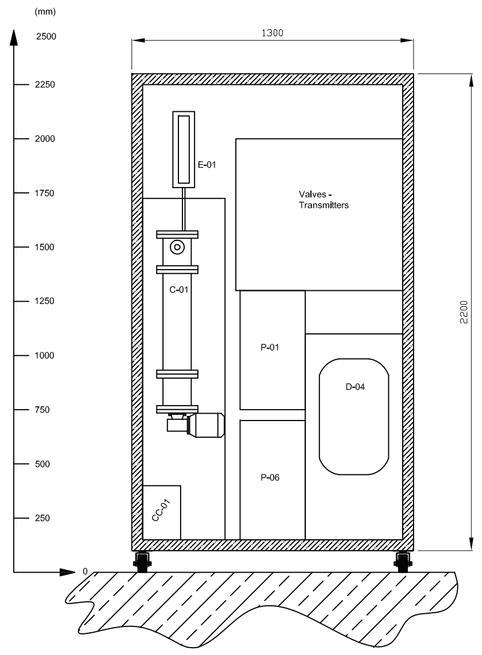
NOTES:

Rev.	Description	Prep.	Date	Firm	Aprob.
0	Basic Engineering	F.G.	28.04.08		

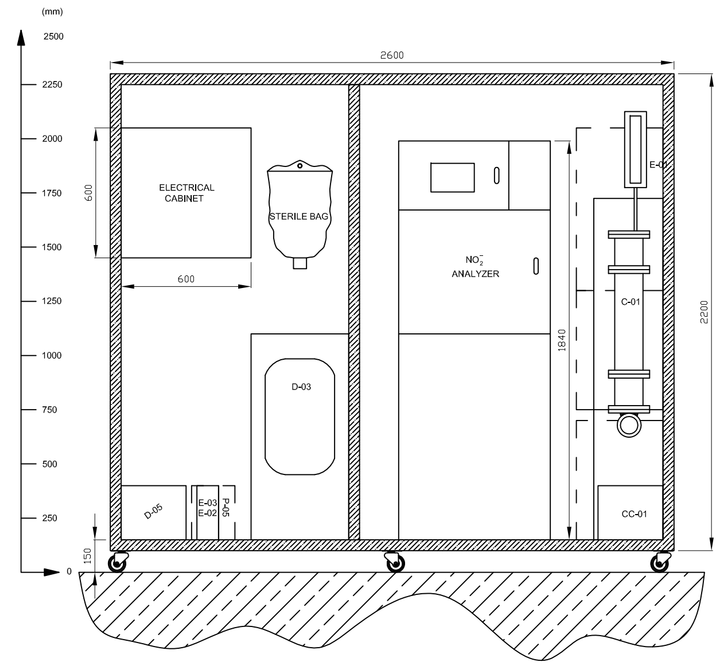
5. LAYOUT SKID



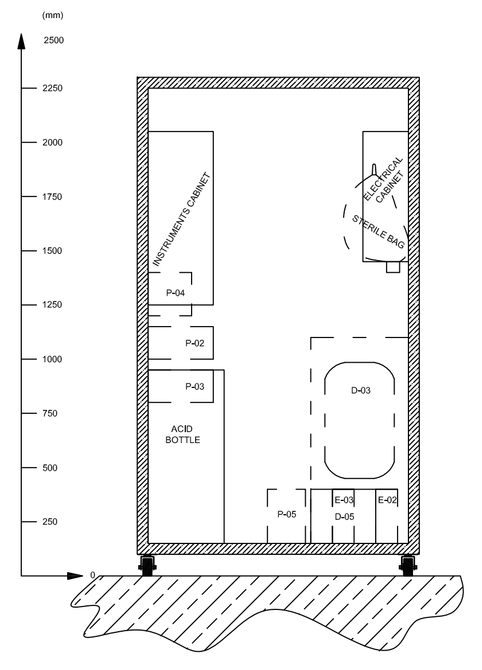
PLAN VIEW
1:10



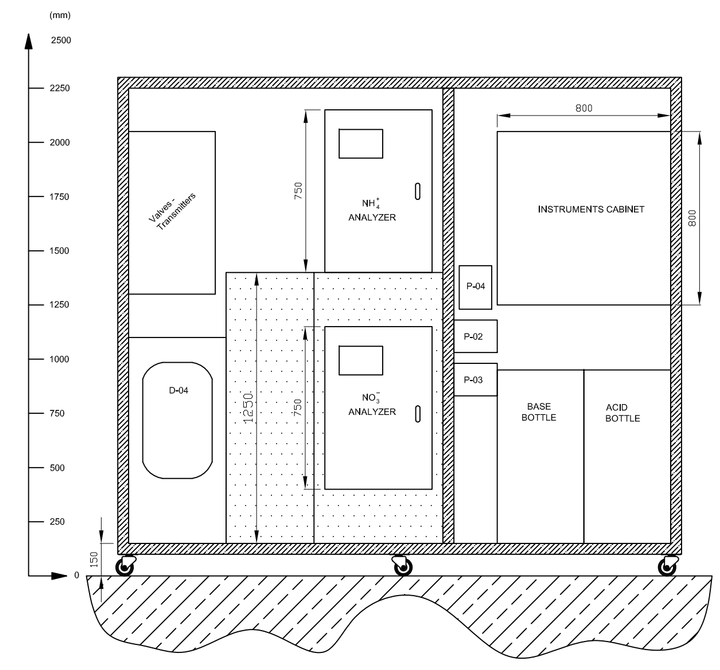
SIDE VIEW A
1:20



SIDE VIEW B
1:20



SIDE VIEW C
1:20



SIDE VIEW D
1:20

REVIS.	ZONE	DESCRIPTION	DATE	PREPARED BY	CHECKED BY	APPROVED
3						
2						
1		COMMENTS FROM MELISSA	08.06.04	C.B.A.	J.R.E.	------
0		FOR APPROVAL	08.05.20	C.B.A.	J.R.E.	------

MODIFICATIONS

7+1 Ingenieros Consultores

CLIENT: Melissa P.P. U.A.B.

PROJECT: Melissa Pilot Plant Compartment III

	DESIGNED BY	CHECKED BY	APPROVED	APPROVED CONSTRUCTION
NAME	------	------	------	------
DATE	------	------	------	------

FORMAT: A1

SCALE: 1:10/1:20

DRAWING TITLE: LAYOUT SKID COMPARTMENT III

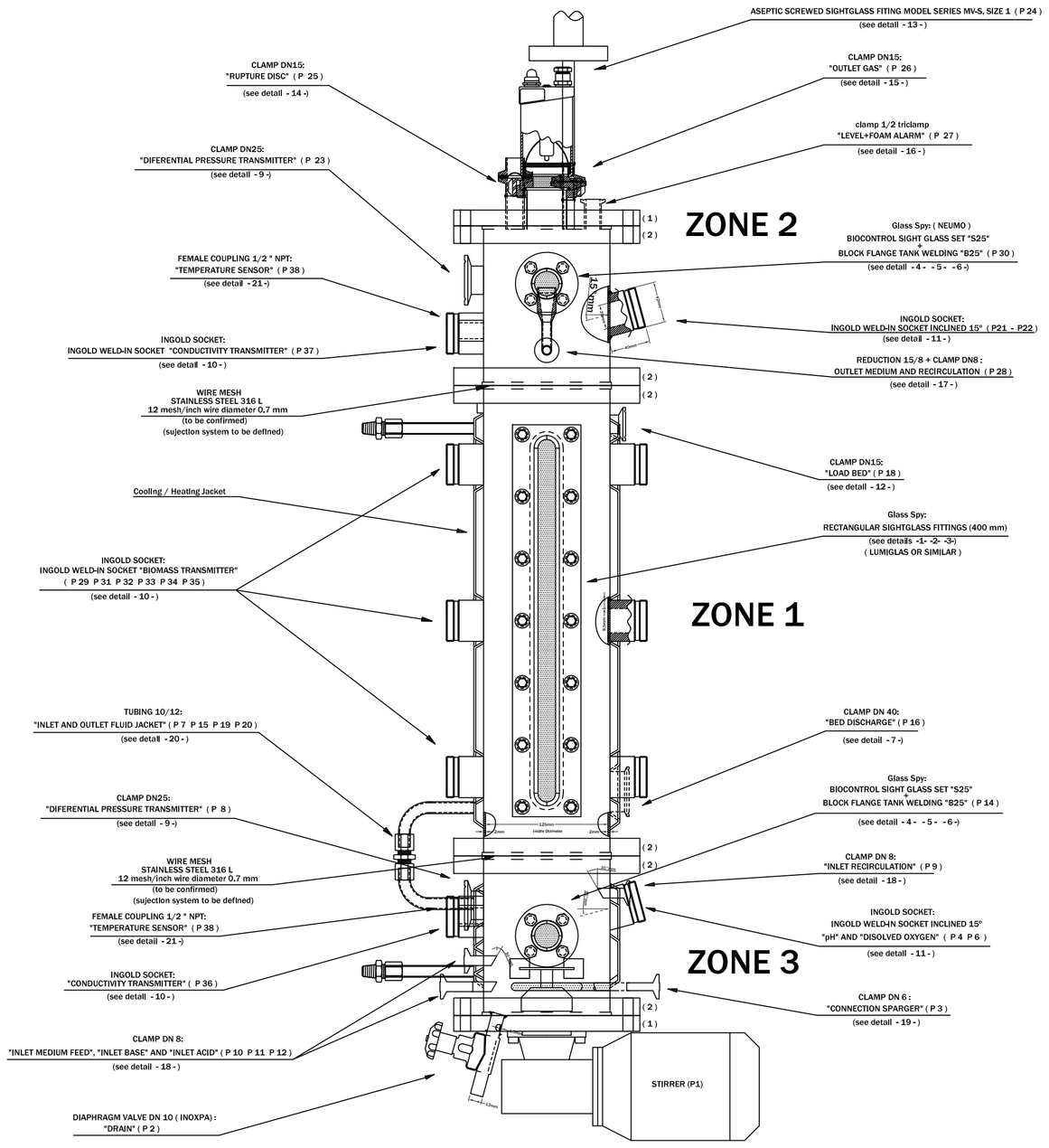
DRAWING NUMBER: P1701-DR-016

SHEET 1 OF 1

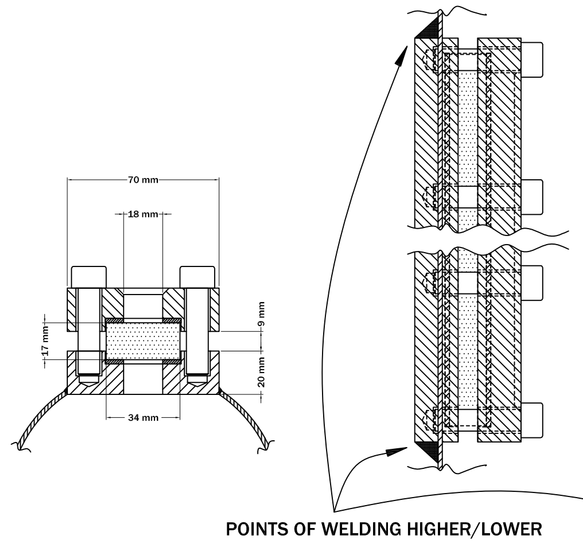
REV. 1

ARCHIVE: P1701-DR-2.dwg

6. VESSEL'S DRAWINGS

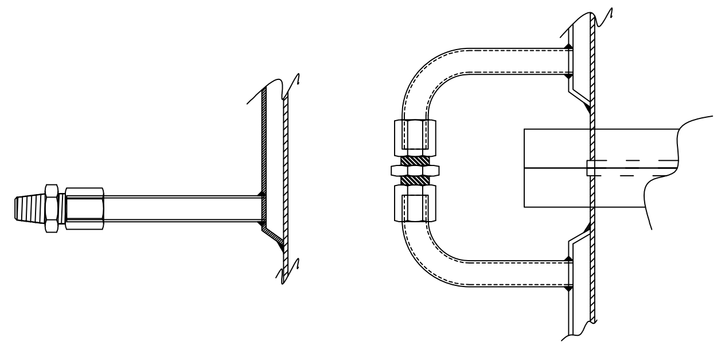


SCALE 1:4



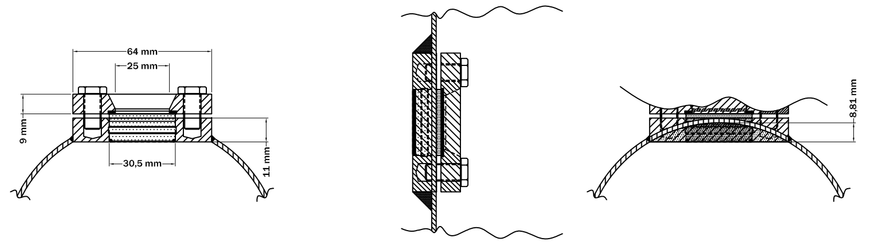
DETAILS -1- -2- -3-

- GLASS SPY P17 -



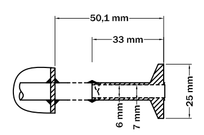
DETAIL - 20 -

RACORD NPT 1/2 DIAMETER 12
"INLET AND OUTLET FLUID JACKET" (P 7 P 15 P 19 P 20)



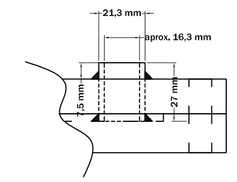
DETAIL - 4 - -5- - 6 -

- GLASS SPY P30 and P14 -
NEUMO



DETAIL - 19 -

CLAMP DN 6 :
"CONNECTION SPARGER" - P 3 -



DETAIL - 21 -

FEMALE COUPLING 1/2 " NPT:
"TEMPERATURE" - P 5 - P 38 - P 39 -

PROJECT SPECIFICATIONS

CODE: ASME VIII - DIV. 1 LAST ISSUE
SPECIFICATIONS:

MATERIAL SPECIFICATIONS

SHELL	AISI 316 L
BOTTOMS	AISI 316 L
FLANGES	AISI 316 L
FLANGES TYPE PAD	AISI 316 L
NOZZLES NECK	AISI 316 L
PIPING	AISI 316 L
FITTINGS	AISI 316 L
SUPPORT OUTSIDE	AISI 316 L
SUPPORT INSIDE	AISI 316 L
INSIDE ELEMENTS DISMANTLED	AISI 316 L
BOLTS, NUTS AND WASHERS	AISI 316 L
GASKETS TO PRESSURE	EPDM
GASKETS WHITOUT PRESSURE	EPDM

PROJECT DATA

	SHELL	JACKET
WORK PRESSURE	1,2 barg	3 barg
PRESSURE DESIGN	2 barg	4 barg
WORK TEMPERATURE	125 °	125°
TEMPERATURE DESIGN	200 °	150°
MARGIN CORROSION	0 mm	
POLISH	Ra < 0,8 µm inside	
X-RAY TESTING		
EFFICIENCY WELDING		
HYDRAULIC PRESSURE TEST IN WORKSHOP	2 - 4 barg	
HYDRAULIC PRESSURE TEST AT SIDE	—	
FLUID NATURE	BROTH (liquid+solid+gas) 1050 kg/m3	
CATEGORY	to be defined	
SURFACE PREPARATION		
ISOLATION	NO	
INSPECTION		
WELDING TYPE		

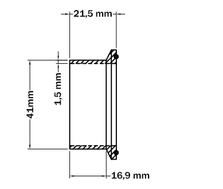
WEIGHTS:
WEIGHT (EMPTY):
WEIGHT (FULL-WATER):

NOTE (1): FLANGE BLIND PART FORM V BIOCONNECT (NEUMO or SIMILAR)
190 mm outside diameter and 16 mm thickness.

NOTE (2): FLANGE FORM R BIOCONNECT (NEUMO or SIMILAR)
190 mm outside diameter and 18 mm thickness.

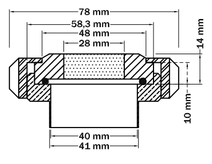
	QUANTITY	NOMINAL DIAMETER	NOMINAL PRES.	FACE	SERVICE	REMARKS
P1	1				CONECTION STIRRER	
P2	1	DN10			DRAIN	
P3	1	DN6			CONECTION SPARGER	
P4	1	DN25			pH SENSOR	
P5	1	1/2"			TEMPERATURE SENSOR	
P6	1	DN25			DISSOLVE OXYGEN SENSOR	
P7	1	12			INLET FLUID JACKET	
P8	1	DN25			DIFERENTIAL PRESSURE TRASM.	
P9	1	DN8			INLET RECIRCULATION	
P10	1	DN8			INLET MEDIUM FEED	
P11	1	DN8			INLET BASE	
P12	1	DN8			INLET ACID	
P13						
P14	1				GLASS SPY	
P15	1	12			OUTLET FLUID JACKET	
P16	1	DN40			BED DISCHARGE	
P17	1				GLASS SPY	
P18	1	DN15			LOAD BED	
P19	1	12			INLET FLUID JACKET	
P20	1	12			OUTLET FLUID JACKET	
P21	1	DN25			pH SENSOR	
P22	1	DN25			DISSOLVE OXYGEN SENSOR	
P23	1	DN25			DIFERENTIAL PRESSURE TRASM.	
P24	1	DN40			SPY HOLE WITH LIGHT	
P25	1	DN15			RUPTURE DISC	
P26	1	DN15			OUTLET GAS	
P27	1	1/2"			LEVEL TRANSMITTER	
P28	1	DN8			OUTLET MEDIUM AND RECIRC.	
P29	1	DN25			BIOMASS SENSOR	
P30	1				GLASS SPY	
P31	1	DN25			BIOMASS SENSOR	
P32	1	DN25			BIOMASS SENSOR	
P33	1	DN25			BIOMASS SENSOR	
P34	1	DN25			BIOMASS SENSOR	
P35	1	DN25			BIOMASS SENSOR	
P36	1	DN25			CONDUCTIVITY TRANSMITTER	
P37	1	DN25			CONDUCTIVITY TRANSMITTER	
P38	1	1/2"			TEMPERATURE TRANSMITTER	
P39	1	1/2"			TEMPERATURE TRANSMITTER	

NOZZLES LIST



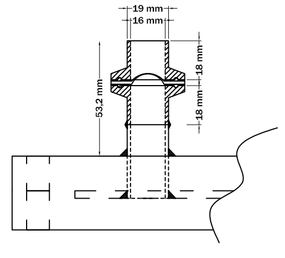
DETAIL - 7 -

CLAMP DN 40:
"BED DISCHARGE" - P16 -



DETAIL - 8 -

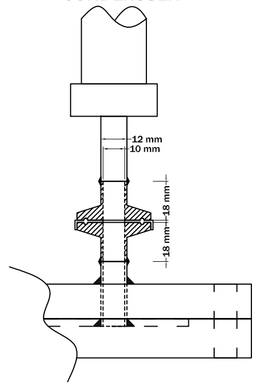
ASEPTIC SCREWED SIGHTGLASS
FITING MODEL SERIES MV-S, SIZE 1
(LUMIGLAS or SIMILAR)
- P24 -



DETAIL - 14 -

CLAMP DN15:
"RUPTURE DISC" - P 25 -

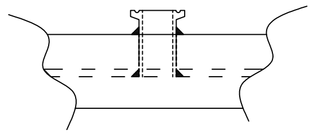
CONDENSSER



DETAIL - 15 -

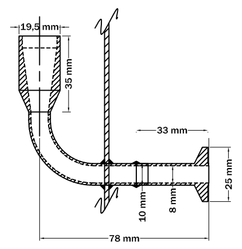
CLAMP DN15:
"OUTLET GAS" - P 26 -

DETAILS SCALE 1:2



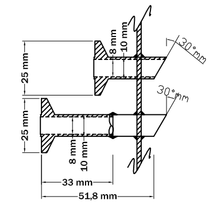
DETAIL - 16 -

TRICLAMP 1/2
"LEVEL+FOAM ALARM" - P 27 -



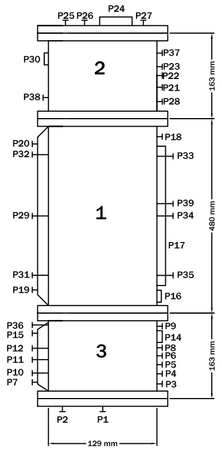
DETAIL - 17 -

REDUCTION 15/8 + CLAMP DN8 :
OUTLET MEDIUM AND RECIRCULATION - P 28 -

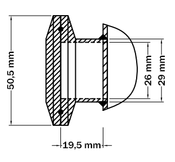


DETAIL - 18 -

CLAMP DN 8:
"INLET MEDIUM FEED", "INLET BASE" AND "INLET ACID"
- P 9 P 10 P 11 P 12 -

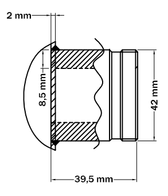


NOT SCALE



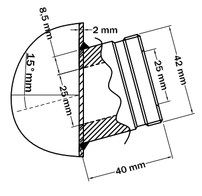
DETAIL - 9 -

CLAMP DN25:
"DIFERENTIAL PRESSURE TRANSMITTER"
- P8 and P23 -



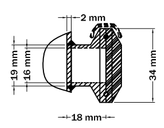
DETAIL - 10 -

INGOLD SOCKET:
INGOLD WELD-IN SOCKET
(P 5 P 36 P 29 P 31 P 32 P 33 P 34 P 35 P 37 P 38)



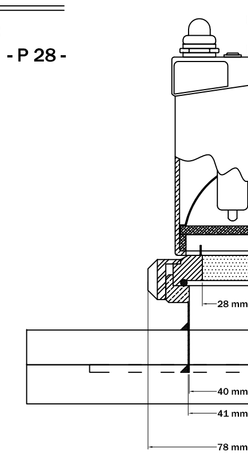
DETAIL - 11 -

INGOLD SOCKET:
INGOLD WELD-IN SOCKET INCLINED 15°
(P 4 P 6 P 29 P 21 P 22)



DETAIL - 12 -

CLAMP DN15:
"LOAD BED" - P 18 -



DETAIL - 13 -

ASPTIC SCREWED SIGHTGLASS FITING MODEL SERIES MV-S, SIZE 1 - P 24 -
(LUMIGLAS or SIMILAR)

3						
2						
1						
0		FOR BASIC DESIGN	08.05.08	C.B.A.	P.G.M.	------
REVIS.	ZONE	DESCRIPTION	DATE	PREPARED BY	CHECKED BY	APPROVED

MODIFICATIONS

7+ Ingenieros Consultores

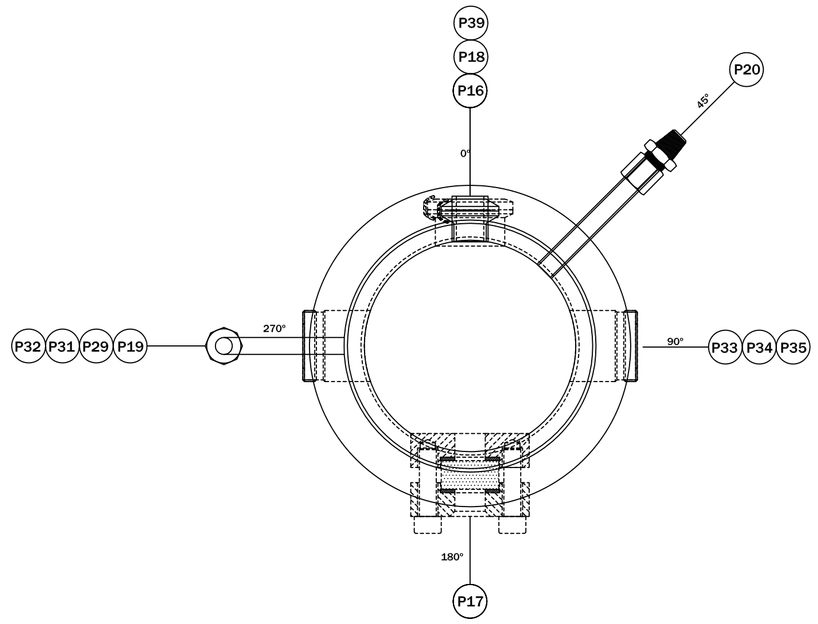
CLIENT: Melissa P.P. U.A.B.

PROJECT: Melissa Pilot Plant Compartment III

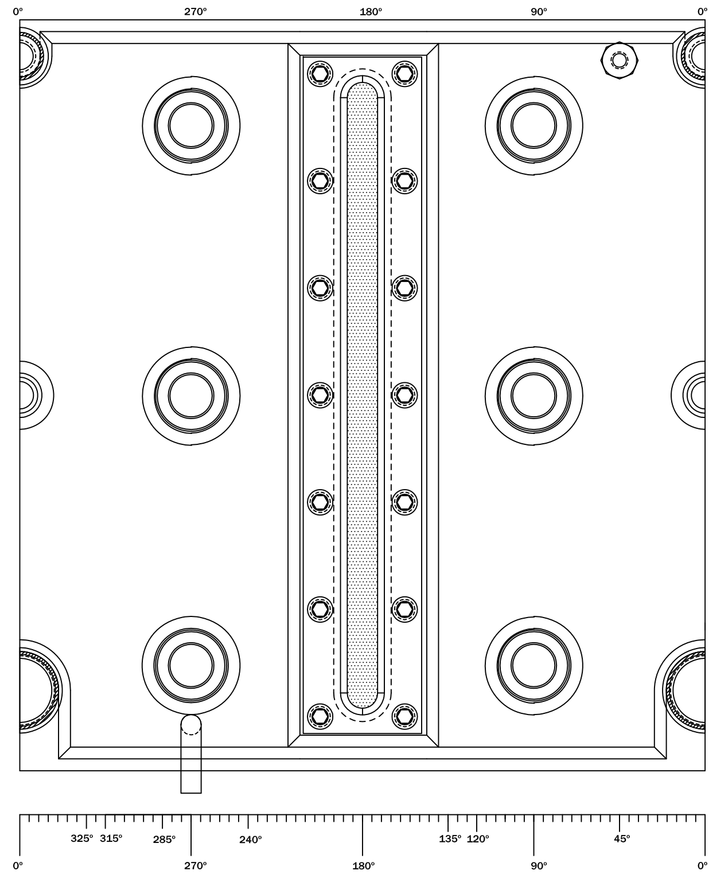
	DESIGNED BY	CHECKED BY	APPROVED	APPROVED CONSTRUCTION
NAME	------	------	------	------
DATE	------	------	------	------

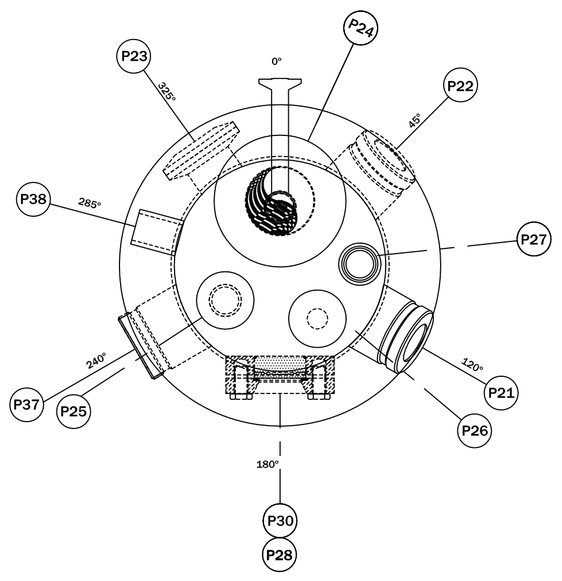
FORMAT: A1
SCALE: 1:4/1:2
DRAWING TITLE: C-01 REACTOR AND DETAILS

DRAWING NUMBER: P1701-DR-EQ-014
SHEET 1 DE 1
REV. 0
ARCHIVE: P1701-DR-1.dwg

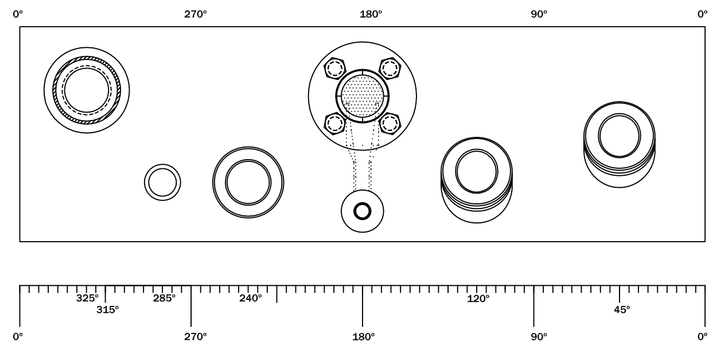


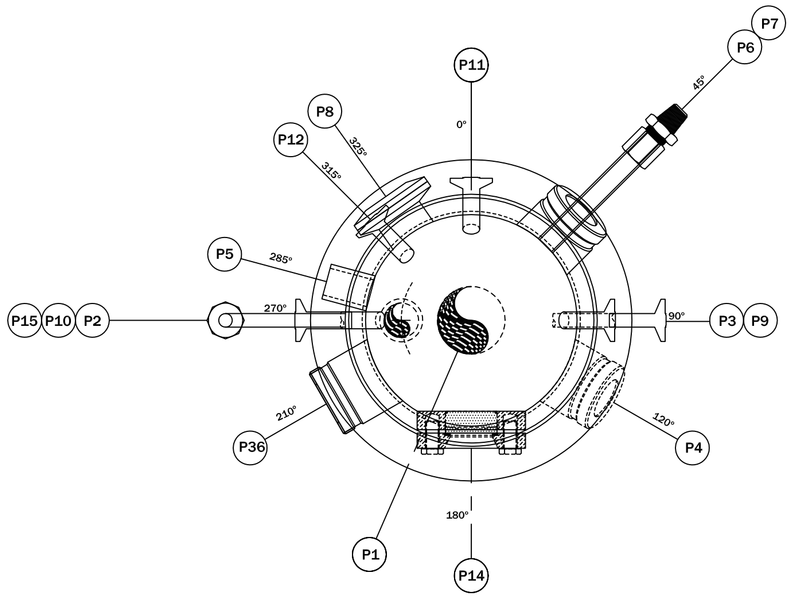
ZONE 1



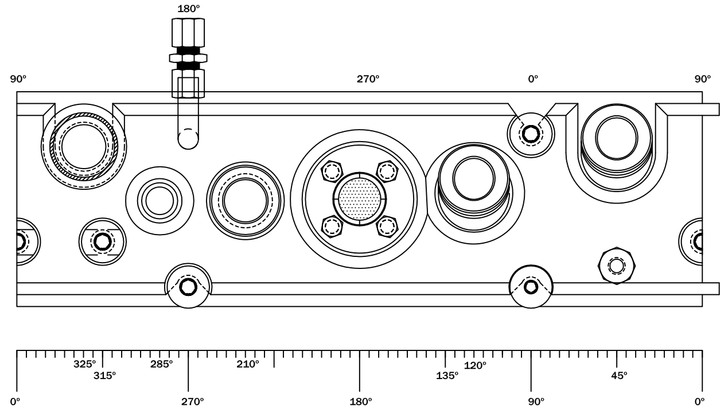


ZONE 2





ZONE 3



REVS.	ZONE	DESCRIPTION	DATE	PREPARED BY	CHECKED BY	APPROVED
3						
2						
1						
0		FOR BASIC DESIGN	08.05.08	C.B.A.	P.G.M.	------

MODIFICATIONS

7+ Ingenieros Consultores

CLIENT: Melissa P.P. U.A.B.

PROJECT: Melissa Pilot Plant Compartment III

	DESIGNED BY	CHECKED BY	APPROVED	APPROVED CONSTRUCTION
NAME	------	------	------	------
DATE	------	------	------	------

FORMAT: A1

SCALE: --

DRAWING TITLE: C-01 SECTIONS AND DETAILS

DRAWING NUMBER: P1701-DR-EQ-015

SHEET 1 DE 1

REV. 0

ARCHIVE: P1701-DR-3.dwg

7. HAZOP

HAZOP ANALYSIS

REPORT

EM Issue	DESCRIPTION	COMPIL	VERIF.	APPROV	DATE
0	BASIC ENGINEERING	PGM			23.05.08

This Report is made up of the following:

- HAZOP Analysis Procedure
- Records of deviations by systems, including
  - Analysis of Deviations Sheet
  - Checking of Deviations Sheet

HAZOP ANALYSIS PROCEDURE

EM Issue	DESCRIPTION	COMPIL	VERIF.	APPROV	DATE
0		FG	PGM		23.05.08

INDICE

ANNEXES

1. OBJECT

The object of this Procedure is to define the activities related to preparation and fulfilment of HAZOP Analysis (Hazardous and Operability) to carry out in relation to the new Compartment III of Melissa Pilot Plant.

2. SCOPE

This procedure defines the activities to do in the HAZOP Analysis, from its preparation and definition of the actions to take as far as the results of analysis and monitoring the agreed measures.

HAZOP is an analysis of comprehension, systematic and structured about the proposed design.

The causes and dangerous consequences of a potential deviation of the plant in relation to standard working have to be considered, identified and finally resolved.

3. PROCEDURE

3.1 Objective

HAZOP is an independent review of the project, carried out to examine in enough detail that allow to identify some potential deviations from the planned standard working, which could be an operative problem or a risk.

3.2 REQUIREMENTS

HAZOP Analysis will use the information that describes the proposed design.

The typical drawings and documents required are:

- P&I Diagram
- Layouts
- Safety Data Sheets of materials
- Process Description
- Predicted Functional Data
- Chemical Reaction Data
- Equipment List including construction materials
- Risk Areas Classification Drawing
- Emissions Summary: Gasses, Liquids and Solids

3.3 TEAM

A HAZOP team would be made up of people from the different areas involved in the project. Typically: knowledgeable about process (Development department), facilities user (Production dept.), project responsible (Engineering dept.) and also members of Health Safety and Environmental department. It could be interested also the HAZOP activities were managed and coordinated by a people not involved in the project.

The team will have to identify the risk problems and consequently its causes and recommended actions to do for correcting it.

HAZOP team will take the agreed solutions and recommendations into consideration and they will be responsible for its acceptance or rejection.

It has to be checked the agreed modifications does not affect the safety of design.

3.4 PROCEDURE

First of all, it has to be identified the systems, pipes and equipments that:

- To require a complete HAZOP review
- It was backup or redundant
- It was generic
- It does not have interactions

From that, it will begin the HAZOP analysis about the necessary elements, by means of Key Words and deviation type considered.

It will be analysed the potential causes of these deviations and the predictable consequences.

Finally, It will be decided a recommendation to act that allow to rectify or at least mitigate the problem. If necessary information is not available, it will be defined as action to do obtaining this information, in order to allow taking a final decision.

The criteria to take, it will be to find a safety measure for correcting or mitigating the problem. It has not been considered the double failure, except for an exceptional case that could require it due to consequences of exceptional risk.

The different systems considered in the present Project have seen:

System 1 – Acid addition

System 2 – Base addition

System 3 – Culture Medium Feeding

System 4 – Outlet broth

System 5 – Reactor

System 6 – Recirculation and Backwashing

System 7 – Gas Recirculation

3.5 RECOMMENDATIONS REVIEW

Once shows the recommendations, HAZOP team will study if they are suitable to take.

In affirmative case, it will show the way to carrying out these recommendations and to determine the responsible to implement its.

In refusal case, this will be documented showing the reasons that have gone to take this decision.

When was considered necessary, it will carry out a review about the following up of recommendation decided, using the method considered more operative for the review.

ANNEXES

1. CHECKING OF DEVIATIONS SHEET

2. ANALYSIS OF DEVIATIONS SHEET

CHECKING OF DEVIATIONS SHEET

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
1.- QUANTITY	a- High Flow	
	b- Low Flow	
	c- No Flow	
	d- Opposite Flow	
	e- Different Flow	
2- FISICAL CONDITION	a- High/Low Pressure	
	b- High/Low Temperature	
	c- High/Low Viscosity	
	d- Static evolution	
3- CHEMICAL CONDITION	a- High/Low Concentration	
	b- High/Low pH	
	c- Different to	
4- TIME	a- Too Long	
	b- Too Short	
5- SEQUENCE	a- Too early/ Too late Step	
	b- Leap/ Backward of Step	
	c- Partially omitted Step/ extra-action included	
	d- Wrong action carried out	
6- INSIDE OF EQUIPMENT	a- High/Low Reaction	
	b- High/Low Mixture	
	c- High/Low Level	

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
7- EFFLUENTS	a- Compatibility	
8- EMERGENCIES	a- Electrical, Air, Water Nitrogen, Steam Shut-Down, etc. b- Others shut down	
9-CORROSION/EROSION		
10- IGNITION		
11- MAINTENANCE		

Situation key letter:

A Deviation – required action
P Deviation – It is already protected
NO Deviation not produced – action not needed

HAZOP
DEVIATIONS ANALYSIS

PROJECT Nº P1701
NOMBRE COMPARTMENT III
P&I Nº
SHEET 0F
DATE

SYSTEM OPERATION

SYSTEM COMPONENTS INVOLVES IN THE OPERATION

HAZOP TEAM	NAME	SIGNATURE
COORDINATOR		
PRODUCTION		
DEVELOPMENT		
ENGINEERING		
HS&E		

ITEM	KEY WORD / DEVIATION	CAUSES	CONSEQUENCES	RECOMMENDATION	ANSWER A / P / NO	ACTION BY	FOLOWING UP REVIEW

RECORDS OF DEVIATIONS

HAZOP
DEVIATIONS ANALYSIS

PROJECT Nº P1701
NOMBRE COMPARTMENT III
P&I Nº
SHEET 0F
DATE MAY-2008

SYSTEM: 1 – Acid addition OPERATION

SYSTEM COMPONENTS INVOLVES IN THE OPERATION:
- Bottle
- Peristaltic pump
- Filter

HAZOP TEAM	NAME	SIGNATURE
COORDINATOR	FG	
PRODUCTION		
DEVELOPMENT		
ENGINEERING	PGM	
HS&E		

ITEM	KEY WORD / DEVIATION	CAUSES	CONSEQUENCES	RECOMMENDATION	ANSWER A / P / NO	ACTION BY	FOLOWING UP REVIEW
1.1	No Flow	Dirty filter	Potential broken silicone tube of peristaltic pump	To keep a check periodically on filter pressure	A	USER (1)	
				To protect against splash	A	CONSTRUCTOR	
1.2	Opposite Flow	Pump + check-valve malfunction	Overflowing acid	To convey vents to safe place	A	CONSTRUCTOR	
1.3	High Pressure	= See 1.1	= see 1.1	Existing safety measure	P		
1.4	High Temperature	Sterilization step	Burn hazard	To indicate “Burn-Hazard” during this operation	A	USER (2)	
1.5	High Concentration	Bad preparation of reactive	No Risks		NO		
1.6	High Level	= See 1.2	= See 1.2	Existing safety measure	P		
1.7	Electrical failure	Electrical shut-down	No Risks	Existing safety measure	P		

NOTES:
(1): To make a procedure to take note and recorder the filter pressure and its trend
(2): To make a procedure to indicate the zone with burn-hazard during sterilization operation.

Ingenieros Consultores	CHECKING OF DEVIATIONS SHEET HAZOP ANALYSIS	

SYSTEM: 1 – Acid addition

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
1.- QUANTITY	a- High Flow	NO
	b- Low Flow	NO
	c- No Flow	A
	d- Opposite Flow	A
	e- Different Flow	NO
2- FISICAL CONDITION	a- High/Low Pressure	P
	b- High/Low Temperature	A
	c- High/Low Viscosity	NO
	d- Static evolution	NO
3- CHEMICAL CONDITION	a- High/Low Concentration	P
	b- High/Low pH	NO
	c- Different to	NO
4- TIME	a- Too Long	NO
	b- Too Short	NO
5- SEQUENCE	a- Too early/ Too late Step	NO
	b- Leap/ Backward of Step	NO
	c- Partially omitted Step/ extra-action included	NO
	d- Wrong action carried out	NO
6- INSIDE OF EQUIPMENT	a- High/Low Reaction	NO
	b- High/Low Mixture	NO
	c- High/Low Level	P

Ingenieros Consultores	**CHECKING OF DEVIATIONS SHEET** **HAZOP ANALYSIS**	

CONDITION WITH CHANGE	**DEVIATION TYPE**	**SITUATION**
7- EFFLUENTS	a- Compatibility	NO
8- EMERGENCIES	a- Electrical, Air, Water Nitrogen, Steam Shut-Down, etc.	P
	b- Others shut down	NO
9 -CORROSION/EROSION		NO
10- IGNITION		NO
11- MAINTENANCE		NO

Situation key letter:

A Deviation – required action
P Deviation – It is already protected
NO Deviation not produced – action not needed

HAZOP
DEVIATIONS ANALYSIS

PROJECT Nº P1701
NOMBRE COMPARTMENT III
P&I Nº
SHEET 0F
DATE MAY-2008

SYSTEM: 2 – Base addition OPERATION

SYSTEM COMPONENTS INVOLVES IN THE OPERATION:
- Bottle
- Peristaltic pump
- Filter

HAZOP TEAM	NAME	SIGNATURE
COORDINATOR	FG	
PRODUCTION		
DEVELOPMENT		
ENGINEERING	PGM	
HS&E		

ITEM	KEY WORD / DEVIATION	CAUSES	CONSEQUENCES	RECOMMENDATION	ANSWER A / P / NO	ACTION BY	FOLOWING UP REVIEW
2.1	No Flow	Dirty filter	No Risk		P		
			No Risk		P		
2.2	Opposite Flow	Pump + check-valve malfunction	No Risk		P		
2.3	High Pressure	= See 2.1	No Risk		P		
2.4	High Temperature	Sterilization step	Burn hazard	To indicate “Burn-Hazard” during this operation	A	USER (1)	
2.5	High Concentration	Bad preparation of reactive	No Risks		NO		
2.6	High Level	= See 2.2	= See 2.2	Existing safety measure	P		
2.7	Electrical failure	Electrical shut-down	No Risks	Existing safety measure	P		

NOTES:
(1): To make a procedure to indicate the zone with burn-hazard during sterilization operation.

Ingenieros Consultores	CHECKING OF DEVIATIONS SHEET HAZOP ANALYSIS	

SYSTEM: 2 – Base addition

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
1.- QUANTITY	a- High Flow	NO
	b- Low Flow	NO
	c- No Flow	P
	d- Opposite Flow	P
	e- Different Flow	NO
2- FISICAL CONDITION	a- High/Low Pressure	P
	b- High/Low Temperature	A
	c- High/Low Viscosity	NO
	d- Static evolution	NO
3- CHEMICAL CONDITION	a- High/Low Concentration	P
	b- High/Low pH	NO
	c- Different to	NO
4- TIME	a- Too Long	NO
	b- Too Short	NO
5- SEQUENCE	a- Too early/ Too late Step	NO
	b- Leap/ Backward of Step	NO
	c- Partially omitted Step/ extra-action included	NO
	d- Wrong action carried out	NO
6- INSIDE OF EQUIPMENT	a- High/Low Reaction	NO
	b- High/Low Mixture	NO
	c- High/Low Level	P

Ingenieros Consultores	**CHECKING OF DEVIATIONS SHEET** **HAZOP ANALYSIS**	

CONDITION WITH CHANGE	**DEVIATION TYPE**	**SITUATION**
7- EFFLUENTS	a- Compatibility	NO
8- EMERGENCIES	a- Electrical, Air, Water Nitrogen, Steam Shut-Down, etc.	P
	b- Others shut down	NO
9-CORROSION/EROSION		NO
10- IGNITION		NO
11- MAINTENANCE		NO

Situation key letter:

A Deviation – required action
P Deviation – It is already protected
NO Deviation not produced – action not needed

HAZOP
DEVIATIONS ANALYSIS

PROJECT Nº P1701
NOMBRE COMPARTMENT III
P&I Nº
SHEET 0F
DATE MAY-2008

SYSTEM: 3 – Cult. medium feeding OPERATION

SYSTEM COMPONENTS INVOLVES IN THE OPERATION:
- Vessel
- Peristaltic pump
- Filters

HAZOP TEAM	NAME	SIGNATURE
COORDINATOR	FG	
PRODUCTION		
DEVELOPMENT		
ENGINEERING	PGM	
HS&E		

ITEM	KEY WORD / DEVIATION	CAUSES	CONSEQUENCES	RECOMMENDATION	ANSWER A / P / NO	ACTION BY	FOLOWING UP REVIEW
3.1	No Flow	Dirty filter	No Risk		P		
			No Risk		P		
3.2	Opposite Flow	Pump + check-valve malfunction	No Risk		P		
3.3	High Pressure	= See 3.1	No Risk		P		
3.4	High Temperature	Sterilization step	Burn hazard	To indicate “Burn-Hazard” during this operation	A	USER (1)	
3.5	High Concentration	Bad preparation of reactive	No Risks		NO		
3.6	High Level	= See 3.2	= See 3.2	Existing safety measure	P		
3.7	Electrical failure	Electrical shut-down	No Risks	Existing safety measure	P		

NOTES:
(1): To make a procedure to indicate the zone with burn-hazard during sterilization operation.

Ingenieros Consultores	CHECKING OF DEVIATIONS SHEET HAZOP ANALYSIS	

SYSTEM: 3 – Culture Medium Feeding

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
1.- QUANTITY	a- High Flow	NO
	b- Low Flow	NO
	c- No Flow	P
	d- Opposite Flow	P
	e- Different Flow	NO
2- FISICAL CONDITION	a- High/Low Pressure	P
	b- High/Low Temperature	A
	c- High/Low Viscosity	NO
	d- Static evolution	NO
3- CHEMICAL CONDITION	a- High/Low Concentration	P
	b- High/Low pH	NO
	c- Different to	NO
4- TIME	a- Too Long	NO
	b- Too Short	NO
5- SEQUENCE	a- Too early/ Too late Step	NO
	b- Leap/ Backward of Step	NO
	c- Partially omitted Step/ extra-action included	NO
	d- Wrong action carried out	NO
6- INSIDE OF EQUIPMENT	a- High/Low Reaction	NO
	b- High/Low Mixture	NO
	c- High/Low Level	NO

Ingenieros Consultores	**CHECKING OF DEVIATIONS SHEET** **HAZOP ANALYSIS**	

CONDITION WITH CHANGE	**DEVIATION TYPE**	**SITUATION**
7- EFFLUENTS	a- Compatibility	NO
8- EMERGENCIES	a- Electrical, Air, Water Nitrogen, Steam Shut-Down, etc.	P
	b- Others shut down	NO
9-CORROSION/EROSION		NO
10- IGNITION		NO
11- MAINTENANCE		NO

Situation key letter:

A Deviation – required action
P Deviation – It is already protected
NO Deviation not produced – action not needed

HAZOP
DEVIATIONS ANALYSIS

PROJECT Nº P1701
NOMBRE COMPARTMENT III
P&I Nº
SHEET 0F
DATE MAY-2008

SYSTEM: 4 – Outlet broth OPERATION

SYSTEM COMPONENTS INVOLVES IN THE OPERATION:
- Vessel
- Filters

HAZOP TEAM	NAME	SIGNATURE
COORDINATOR	FG	
PRODUCTION		
DEVELOPMENT		
ENGINEERING	PGM	
HS&E		

ITEM	KEY WORD / DEVIATION	CAUSES	CONSEQUENCES	RECOMMENDATION	ANSWER A / P / NO	ACTION BY	FOLOWING UP REVIEW
4.1	No Flow	Dirty filter	No Risk		P		
			No Risk		P		
4.2	High Pressure	= See 4.1	No Risk		P		
4.3	High Temperature	Sterilization step	Burn hazard	To indicate “Burn-Hazard” during this operation	A	USER (1)	
4.4	High Concentration	Bad preparation of reactive	No Risks		NO		
4.5	High Level	= See 4.2	= See 4.2	Existing safety measure	P		
4.6	Electrical failure	Electrical shut-down	No Risks	Existing safety measure	P		

NOTES:
(1): To make a procedure to indicate the zone with burn-hazard during sterilization operation.

Ingenieros Consultores	CHECKING OF DEVIATIONS SHEET HAZOP ANALYSIS	

SYSTEM: 4 – Outlet broth

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
1.- QUANTITY	a- High Flow	NO
	b- Low Flow	NO
	c- No Flow	P
	d- Opposite Flow	P
	e- Different Flow	NO
2- FISICAL CONDITION	a- High/Low Pressure	P
	b- High/Low Temperature	A
	c- High/Low Viscosity	NO
	d- Static evolution	NO
3- CHEMICAL CONDITION	a- High/Low Concentration	P
	b- High/Low pH	NO
	c- Different to	NO
4- TIME	a- Too Long	NO
	b- Too Short	NO
5- SEQUENCE	a- Too early/ Too late Step	NO
	b- Leap/ Backward of Step	NO
	c- Partially omitted Step/ extra-action included	NO
	d- Wrong action carried out	NO
6- INSIDE OF EQUIPMENT	a- High/Low Reaction	NO
	b- High/Low Mixture	NO
	c- High/Low Level	P

Ingenieros Consultores	**CHECKING OF DEVIATIONS SHEET** **HAZOP ANALYSIS**	

CONDITION WITH CHANGE	**DEVIATION TYPE**	**SITUATION**
7- EFFLUENTS	a- Compatibility	NO
8- EMERGENCIES	a- Electrical, Air, Water Nitrogen, Steam Shut-Down, etc.	P
	b- Others shut down	NO
9-CORROSION/EROSION		NO
10- IGNITION		NO
11- MAINTENANCE		NO

Situation key letter:

A Deviation – required action
P Deviation – It is already protected
NO Deviation not produced – action not needed

HAZOP
DEVIATIONS ANALYSIS

PROJECT Nº P1701
NOMBRE COMPARTMENT III
P&I Nº
SHEET 0F
DATE MAY-2008

SYSTEM: 5 – Reactor OPERATION

SYSTEM COMPONENTS INVOLVES IN THE OPERATION:
- Vessel + stirrer + vent condenser
- Heating / Cooling system
- Bed loading

HAZOP TEAM	NAME	SIGNATURE
COORDINATOR	FG	
PRODUCTION		
DEVELOPMENT		
ENGINEERING	PGM	
HS&E		

ITEM	KEY WORD / DEVIATION	CAUSES	CONSEQUENCES	RECOMMENDATION	ANSWER A / P / NO	ACTION BY	FOLOWING UP REVIEW
5.1	High Pressure	Filter Block	No risk	Already protected by rupture disc	P		
5.2	High Temperature	Sterilization step	Burn hazard	To indicate “Burn-Hazard” during this operation	A	USER (1)	
5.3	Static evolution	To get dirty the bed	ΔP increase without risk	backwashing	P		
5.4	Different pH	Malfunction pH-control	No Risk		P		
5.5	High Level	Level-control failure	Flooded Reactor + dirty Filters – No Risk		P		
5.6	Electrical failure	Electrical shut-down	No Risks	Existing safety measure	P		
5.7	Maintenance Dismantling	Equipment Cleaning, bed	Energized Stirrer	To include: Flanges with switch (agitator shut-down)	A	ENG	
				emergency switch-off	P		

NOTES:
(1): To make a procedure to indicate the zone with burn-hazard during sterilization operation.

Ingenieros Consultores	CHECKING OF DEVIATIONS SHEET HAZOP ANALYSIS	

SYSTEM: 5 – Reactor

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
1.- QUANTITY	a- High Flow	NO
	b- Low Flow	NO
	c- No Flow	NO
	d- Opposite Flow	NO
	e- Different Flow	NO
2- FISICAL CONDITION	a- High/Low Pressure	P
	b- High/Low Temperature	A
	c- High/Low Viscosity	NO
	d- Static evolution	P
3- CHEMICAL CONDITION	a- High/Low Concentration	NO
	b- High/Low pH	P
	c- Different to	NO
4- TIME	a- Too Long	NO
	b- Too Short	NO
5- SEQUENCE	a- Too early/ Too late Step	NO
	b- Leap/ Backward of Step	NO
	c- Partially omitted Step/ extra-action included	NO
	d- Wrong action carried out	NO
6- INSIDE OF EQUIPMENT	a- High/Low Reaction	NO
	b- High/Low Mixture	NO
	c- High/Low Level	P

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
7- EFFLUENTS	a- Compatibility	NO
8- EMERGENCIES	a- Electrical, Air, Water Nitrogen, Steam Shut-Down, etc.	P
	b- Others shut down	NO
9-CORROSION/EROSION		NO
10- IGNITION		NO
11-MAINTENANCE		A

Situation key letter:

A Deviation – required action
P Deviation – It is already protected
NO Deviation not produced – action not needed

HAZOP
DEVIATIONS ANALYSIS

PROJECT Nº P1701
NOMBRE COMPARTMENT III
P&I Nº
SHEET 0F
DATE MAY-2008

SYSTEM: 6 – Recirculation & Backwashing OPERATION

SYSTEM COMPONENTS INVOLVES IN THE OPERATION:
- Pumps
- inoculation system

HAZOP TEAM	NAME	SIGNATURE
COORDINATOR	FG	
PRODUCTION		
DEVELOPMENT		
ENGINEERING	PGM	
HS&E		

ITEM	KEY WORD / DEVIATION	CAUSES	CONSEQUENCES	RECOMMENDATION	ANSWER A / P / NO	ACTION BY	FOLOWING UP REVIEW
6.1	High Pressure	Filter Block	No risk	Already protected by rupture disc	P		
6.2	High Temperature	Sterilization step	Burn hazard	To indicate “Burn-Hazard” during this operation	A	USER (1)	
6.3	Wrong action carried out	Does not open impulsion valve of pump	Pressure increase No Risk	Existing pump safety	P		
6.4	Electrical failure	Electrical shut-down	No Risks	Existing safety measure	P		
6.5	Maintenance	Dismantling under current	Injury risk	Internal maintenance procedure	A	USER	
				emergency switch-off	P		

NOTES:
(1): To make a procedure to indicate the zone with burn-hazard during sterilization operation.

Ingenieros Consultores	CHECKING OF DEVIATIONS SHEET HAZOP ANALYSIS	

SYSTEM: 6 – Recirculation and Backwashing

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
1.- QUANTITY	a- High Flow	NO
	b- Low Flow	NO
	c- No Flow	NO
	d- Opposite Flow	NO
	e- Different Flow	NO
2- FISICAL CONDITION	a- High/Low Pressure	P
	b- High/Low Temperature	A
	c- High/Low Viscosity	NO
	d- Static evolution	NO
3- CHEMICAL CONDITION	a- High/Low Concentration	NO
	b- High/Low pH	NO
	c- Different to	NO
4- TIME	a- Too Long	NO
	b- Too Short	NO
5- SEQUENCE	a- Too early/ Too late Step	NO
	b- Leap/ Backward of Step	NO
	c- Partially omitted Step/ extra-action included	NO
	d- Wrong action carried out	P
6- INSIDE OF EQUIPMENT	a- High/Low Reaction	NO
	b- High/Low Mixture	NO
	c- High/Low Level	NO

Ingenieros Consultores	**CHECKING OF DEVIATIONS SHEET** **HAZOP ANALYSIS**	

CONDITION WITH CHANGE	**DEVIATION TYPE**	**SITUATION**
7- EFFLUENTS	a- Compatibility	NO
8- EMERGENCIES	a- Electrical, Air, Water Nitrogen, Steam Shut-Down, etc.	P
	b- Others shut down	NO
9-CORROSION/EROSION		NO
10- IGNITION		NO
11- MAINTENANCE		NO

Situation key letter:

A Deviation – required action
P Deviation – It is already protected
NO Deviation not produced – action not needed

HAZOP
DEVIATIONS ANALYSIS

PROJECT Nº P1701
NOMBRE COMPARTMENT III
P&I Nº
SHEET 0F
DATE MAY-2008

SYSTEM: 7 – Gas Recirculation OPERATION

SYSTEM COMPONENTS INVOLVES IN THE OPERATION:
- Compressor
- Filters
- Gasses addition

HAZOP TEAM	NAME	SIGNATURE
COORDINATOR	FG	
PRODUCTION		
DEVELOPMENT		
ENGINEERING	PGM	
HS&E		

ITEM	KEY WORD / DEVIATION	CAUSES	CONSEQUENCES	RECOMMENDATION	ANSWER A / P / NO	ACTION BY	FOLOWING UP REVIEW
7.1	No Flow	Filter Block	Pressure increase	To keep a check periodically on filter pressure	A	USER (1)	
				Install safety relief valve	A	ENG	
7.2	High Pressure	= See 7.1					
7.3	High Temperature	Sterilization step	Burn hazard	To indicate “Burn-Hazard” during this operation	A	USER (2)	
7.4	Electrical failure	Electrical shut-down	No Risks	Existing safety measure	P		
7.5	Ignition	Oil or fat in O2 piping	Low ignition	Indicate: “NOT TO GRASE”	A	CONSTRUCTOR	

NOTES:
(1): To make a procedure to take note and recorder the filter pressure and its trend
(2): To make a procedure to indicate the zone with burn-hazard during sterilization operation.

Ingenieros Consultores	CHECKING OF DEVIATIONS SHEET HAZOP ANALYSIS	

SYSTEM: 7 – Gas Recirculation

CONDITION WITH CHANGE	DEVIATION TYPE	SITUATION
1.- QUANTITY	a- High Flow	NO
	b- Low Flow	NO
	c- No Flow	A
	d- Opposite Flow	NO
	e- Different Flow	NO
2- FISICAL CONDITION	a- High/Low Pressure	P
	b- High/Low Temperature	A
	c- High/Low Viscosity	NO
	d- Static evolution	NO
3- CHEMICAL CONDITION	a- High/Low Concentration	NO
	b- High/Low pH	NO
	c- Different to	NO
4- TIME	a- Too Long	NO
	b- Too Short	NO
5- SEQUENCE	a- Too early/ Too late Step	NO
	b- Leap/ Backward of Step	NO
	c- Partially omitted Step/ extra-action included	NO
	d- Wrong action carried out	NO
6- INSIDE OF EQUIPMENT	a- High/Low Reaction	NO
	b- High/Low Mixture	NO
	c- High/Low Level	NO

Ingenieros Consultores	**CHECKING OF DEVIATIONS SHEET** **HAZOP ANALYSIS**	

CONDITION WITH CHANGE	**DEVIATION TYPE**	**SITUATION**
7- EFFLUENTS	a- Compatibility	NO
8- EMERGENCIES	a- Electrical, Air, Water Nitrogen, Steam Shut-Down, etc.	P
	b- Others shut down	NO
9-CORROSION/EROSION		NO
10- IGNITION		A
11- MAINTENANCE		NO

Situation key letter:

A Deviation – required action
P Deviation – It is already protected
NO Deviation not produced – action not needed

8. TECHNICAL REQUISITION

TECHNICAL REQUISITION FOR SKID COMPARTMENT III

Issue	DESCRIPTION	COMPIL	VERIF.	APPROV	DATE
1	General Revision	JRE			06.06.2008
0	Basic Engineering	JRE			26.05.2008

1.-OBJECT.-

This requisition, along with all attached documents, defines the minimum technical data and requirements for supplying of equipments, materials, manufacturing, assembling, testing and inspection, surface treatment and painting, packing and preparation for shipment, transport, insurance and documentation of the following unit detailed:

SKID COMPARTMENT III

Service: Fermentation Pilot Plant Unit

Installation: Indoor

Site Location: The unit will be installed in the laboratories of U.A.B. in Bellaterra-Barcelona (Spain)

Brief Description of the Unit:

The unit are composed of:

Biorector: It is an up-flow co-current packed bed reactor type provided with:

- Sparger
- Magnetic coupling stirrer with variable speed
- Jacket to heat exchange with a closed loop water system
- Temperature control with a cascade between two controllers
- pH control through acid and base addition.pH controller command two peristaltic pumps
- An external closed loop of liquid recirculation through a diaphram pump with variable speed and flow rate control (from top to down)
- A second external closed loop of liquid recirculation (called backwashing) through a second diaphram pump with variable speed and flow rate control (from down to top)
- Inoculation system in recirculation line
- An external closed loop of gas with flow rate control and controlled addition of gases:N2,O2 and CO2
- A continuous culture medium feeding with flow rate control
- A continuous outlet of broth with a flow rate control

Addition for pH control: It has been considered two,acid and base,provided with

- Scale with weight transmitter to totalized the consume of reactive
- Peristaltic pump commanded by pH controller

Culture medium feeding:From a sterile vessel trhough a peristaltic pump commanded by flow rate control

Outlet broth: From the recirculation stream to a sterile vessel and controlled with the level control of reactor.It has also flow rate mesurement and totalizing

Because all inputs to reactor must be sterilized before to put them inside, there are sterile filtration by cartridges in all streams

2.-SCOPE OF SUPPLY.-

The Vendor's supply shall include the equipments, instruments, materials, manufacture/construction, inspection and testing in factory, surface treatment and painting, packing and preparation for shipment, transport and insurance, supervision for the installation of the Skid Unit detailed on the point 1 of this requisition.

The scope of supply shall include, without being limited, the following equipment, components, works, services and documents:

- Detailed Engineering and Drawings for constructing
- Supply of Equipments and Instruments indicated as *new* in the attached Equipment List and Instruments List (see note 1 bellow)
- Supply of the all materials needed (supporting, pipes, valves, electrical materials and instrumentation materials)
- Metallic baseframe and wheels for skid unit
- All the wires within the limits of the battery, to junction boxes (also included in Vendor's scope of supply).
- Earthing for the unit when needed
- Mechanical and piping ,electrical and instrumentation assembly and erections
- Testing in factory of the equipments, instruments and components.
- Equipment and instruments testing certificates
- Painting, packing, transportation, insurance and unloading of the Skid Unit to final destination (Barcelona-UAB)
- Place on site.
- Commissioning on site: Energize and functional checking.
- Technical Documentation Dossier and "As Built" Drawings.
- Safety, operation and maintenance manuals in Spanish and English language.
- Skid legalisation, including all the necessary documentation for it. Project and legalisation of the pressure vessels
- Vendor's equipment supply will be marked CE
- Any other element, service or document not directly mentioned in the above relation, but necessary for a correct, safe and reliable operation of the unit.

Note 1.-

The equipments and instruments indicated as M.P:P. in the lists will be provided for the owner (U.A.B.)

3.-REQUIREMENTS.-

Baseframe.-

The baseframe (material: AISI 316L) for the Skid Unit supplied by vendor shall have the necessary stiffness to avoid vibrations, and to avoid possible deformations during the unloading, assembly and maintenance of the skid itself.

The Skid Unit shall have the neccesary lifting lugs. These shall be located in the best way to avoid damaging the structure during the unloading. Both number and layout of the lugs shall be vendor's responsibility, according to their experience.

Both piping connections and junction boxes should be located at the limit of the unit (in the baseframe edge), for an easy access.

Pipes.-

All the interconnection pipes (material AISI 316 L) between the equipments in the unit will be supplied by Vendor

The welding class will be TIG welding.

Electric Equipments.-

The Skid Unit has been considered installed in not classified zone.

Therefore, all the electric material ,to be supplied, should have the adequate protection.

The Skid Unit will have earthings (two at least).They will be preferably located in the equipment baseframe, to make an easier earthing connection (by others).

Available electric power characteristics: 220/230 V, 50Hz

4.- EXCLUSIONS.-

- Any type of civil work, electric interconnection between junction boxes to electric room or PLC or DCS..
- The connections of the existing analyzers for $NH4^{+}$;$NO3^{-}$ and $NO2^{-}$ (supplied by UAB)

The mentioned items remain out of the Vendor's scope of supply

5.- GUARANTEES.-

Mechanical Guarantee

All the supply (equipments and components) shall have a mechanical guarantee against fabrication defects for a period of 12 months after the delivery. Such guarantee covers any expense due to parts, work, travels, lodging and travelling expenses.

The Vendor shall substitute, modify or change any element or sub-system in order to obtain the pertaining performance characteristics without extracost for the customer.

In any case

- the normal operation failures,like joint leaks,movable parts consumption,cartridges filtration,etc.
- damages because of a bad operation or handling of the unit.

are not included in the mechanical guarantee

6.- APLICABLE CODES ,NORMS AND STANDARDS.-

The supply must fulfil, minimum, the following codes, norms and standards in their last edition (when applicable).

CODES, NORMS AND STANDARDS

- REGLAMENTO DE APARATOS A PRESIÓN –RAP-(Spanish Code for Pressure Vessel) and CEE DIRECTIVES ON PRESSURE VESSELS
- REGLAMENTO ELECTROTÉCNICO DE BAJA TENSIÓN (Low Voltage Spanish Code)
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS .....ASME
- AMERICAN SOCIETY FOR TESTING AND MATERIALS.....ASTM
- AMERICAN NATIONAL STANDARDS INSTITUTE .....ANSI
- AMERICAN IRON AND STEEL INSTITUTE .....AISI

7.- PAINTING AND PREPARATION FOR TRANSPORTATION

The surface, materials and application preparations should be in accordance with the Vendor's standards and will include, as minimum, priming with inorganic zinc primer coat and finish painting for carbon steel surfaces. The stainless steel surfaces shall be pickled and passivated.

The unit package should be the correct to avoid damage in the unit during transportation and/or storage.

8.- REQUIRED TECHNICAL DOCUMENTS AND DRAWINGS FROM VENDOR

Vendor will supply Technical Documentation as follows:

- Drawings of the Skid unit, including the 3D views
- P&I Diagram (final issue)
- Electrical and instrumentation schemes
- Lists of equipments,instruments, cables-wires, pipes and valves
- List of I/O signals
- Certificates of piping materials,valves and instruments.
- Technical Documentation Dossier

- "As built" Drawings
- Safety, operation and maintenance manuals in Spanish and English language.

Vendor's all documentation shall be submitted in paper (1 copy) and also in electronic format

Drawings (including 3D views) and Documents for Construction must be approved by the property (U.A.B.) before construccction.

9.-ATTACHED DOCUMENTS LIST

- P&I DIAGRAM COMPARTMENT III (P1701-DR-001-3)
- EQUIPMENTS & INSTRUMENTS LISTS
- DATA SHEETS for EQUIPMENTS and INSTRUMENTS
- LAYOUT SKID COMPARTMENT III (P1701-DR-016-0)
- C-01 REACTOR--SECTIONS & DETAILS (P1701-DR-EQ-014 & 015)

9. MANUFACTURING QUOTATION

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A/A. D. Enrique Peiro

N/Ref: 3552/0087/8/MEC **Fecha: 28/05/2008**

Asunto: ***Compartimento III – Proyecto MELISSA.***

Muy señores nuestros:

Les expresamos nuestro cordial agradecimiento, al mostrarnos su confianza consultando nuestros precios para el asunto arriba indicado, adjuntándoles gustosamente nuestra mejor oferta TÉCNICO-ECONÓMICA.

Esperando haberles complacido, aprovechamos la ocasión para saludarles muy atentamente,

Fdo.: JUAN LUIS VALLECILLO
Delegado Castilla y León

QUOTATION FOR

COMPARTMENT III
OF THE MELISSA PILOT PLANT

Quotation nº: 3552/087/8/MEC

REV. 0: 28.05.2008

CONTENTS

1.0 INTRODUCTION

This proposal refers to the supply of a fermentation pilot unit, called COMPARTMENT III, for the MELISSA Pilot Plant to be installed at Departamento de Ingeniería Química – Escuela Técnica Superior de Ingeniería – Universidad Autónoma de Barcelona, Campus de Bellaterra

The purpose is to build a SKID with the complete facilities in accordance with the design showed in the Basic Engineering developed by **7+i Ingenieros Consultores**, with which Moncobra has a partnership relation in the field of process engineering.

2.0 DESCRIPTION OF THE PLANT

SKID COMPARTMENT III

Service: Fermentation Pilot Plant Unit

Installation: Indoor

Brief Description of the Unit:

The unit are composed of:

Bioreactor: It is an up-flow co-current packed bed reactor type provided with:

- Sparger
- Magnetic coupling stirrer with variable speed
- Jacket to heat exchange with a closed loop water system
- Temperature control with a cascade between two controllers
- pH control through acid and base addition. pH-controller command two peristaltic pumps
- An external closed loop of liquid recirculation through a diaphragm pump with variable speed and flow rate control (from top to down)
- A second external closed loop of liquid recirculation (called backwashing) through a second diaphragm pump with variable speed and flow rate control (from down to top)
- Inoculation system in recirculation line

- An external closed loop of gas with flow rate control and controlled addition of gases:N2,O2 and CO2
- A continuous culture medium feeding with flow rate control
- A continuous outlet of broth with a flow rate control

Addition for pH control: It has been considered two, acid and base, provided with.

- Scale with weight transmitter to totalize the reactive consumes.
- Peristaltic pump commanded by pH controller.

Culture medium feeding: From a sterile vessel and through a peristaltic pump commanded by a flow rate controller.

Outlet broth: From the recirculation stream to a sterile vessel and controlled with the level control of reactor. It has also flow rate measurement and totalizing.

Because all inputs to reactor must be sterilized before to put them inside, there are sterile filtration by cartridges in all streams.

All of that in accordance with the design contained in Basic Engineering Package:

- PID nº: P1701-DR-001-3
- Equipment List: P1701-LE-001-3
- Instrumentation List: P1701-LI-001-3
- Equipments and Instruments Data sheets included in the previous lists
- Skid Layout nº: P1701-DR-016-0
- Reactor sections and details drawing nº: P1701-DR-EQ-014-0 and P1701-DR-EQ-015-0

3.0 SCOPE OF SUPPLY

The supply will include the equipments, instruments, materials, manufacture/construction, inspection and testing in factory, surface treatment and painting, packing and preparation for shipment, transport and insurance, supervision for the installation of the Skid Unit.

The scope of supply will include the following equipment, components, works, services and documents:

- Detailed Engineering and Drawings for constructing
- Supply of Equipments and Instruments indicated as *new* in the attached Equipment List (P1701-LE-001-3) and Instruments List (P1701-LI-001-3) (The equipments and instruments indicated as M.P.P. in the lists will be provided for the owner)
- Supply of the all materials needed (supporting, pipes, valves, electrical materials and instrumentation materials)
- Metallic base frame and wheels for skid unit
- All the wires within the limits of the battery, to junction boxes (also included in supply).
- Earthing for the unit when needed
- Mechanical and piping, electrical and instrumentation assembly and erections
- Testing in factory of the equipments, instruments and components.
- Painting, packing, transportation, insurance and unloading of the Skid Unit to final destination (Barcelona-UAB)
- Installation and commissioning.
- Technical Documentation Dossier and “as built” Drawings
    - Drawings of the Skid, including 3D view
    - PID final issue
    - Electrical and instrumentation schemes
    - Lists of equipments, instruments, cables-wires, pipes and valves
    - List of I/O signals
    - Certificates of piping materials, valves and instruments.
    - Technical Documentation from manufacturers
    - “As built” Drawings
    - Safety, operation and maintenance manuals in Spanish language.
- Legalisation of Skid and CE marking. Project and legalisation of the pressure vessels.

4.0 COSTRUCTION REQUIREMENTS

Base-frame.-

The base-frame will be constructed in AISI 316L with the necessary stiffness to avoid vibrations and deformations.
The Skid will have the necessary lifting lugs.
Both piping connections and junction boxes will be located at the limit of the unit (in the base-frame edge)

Pipes.-

All the connections pipes between equipments will be AISI 316L and welding procedure will be TIG

Electrical Equipments.-

The Skid has been considered to install in not classified zone. All the electrical material to be supplied will be the adequate protection.

The Skid will have earthings (two at least)

Available electrical power: 220/230v, 50Hz

5.0 EXCLUSIONS

The mentioned items below remain out of the scope of supply:

- Any equipment, instrument, other device and services not specified and listed in the Scope of supply paragraph.
- Any type of civil work, electric interconnection between junction boxes to electric room or PLC or DCS.
- The connections of the existing analyzers for $NH4^{+}$;$NO3^{-}$ and $NO2^{-}$ (supplied by UAB)

6.0 COMMERCIAL CONDITIONS

6.1 Prices

The price for the supply of the Skid indicated in the paragraphs 2.0 and 3.0 above is **358.668 EUR**
The above price is to be intended CIF Universidad Autónoma de Barcelona (UAB).
VAT or any other applicable tax is not included in the above price.

6.2 Payment terms

30% at order
60% at delivery
10% at commissioning and mechanical tests in customer site, against bank guarantee for same amount valid for the period of guarantee.
All payments are to be made at 90 days from invoice date by confirming.

6.3 Delivery time

Expected delivery is within 18 working weeks after accepted order, excluding August.

6.4 Validity of the offer

This offer is valid for 30 days. During this time the indicate prices are firm and not subjected to changes.

6.5 Mechanical Guarantee

The supply is covered by a mechanical guarantee against fabrication defects for a period of 12 months after commissioning and mechanical tests, but not longer than 18 months after delivery. During this period in case of failure of standard components of the plant (instruments, pumps, etc.) the same shall be returned to Moncobra in order to be repaired or substituted according to the vendor guarantee. In any case:

- the normal operation failures, like joint leaks, movable parts consumption, cartridges filtration, etc. and
- damages because of a bad operation or handling of the unit.

are not included in this guarantee.

10. ANNEX: Additional Report on Design Review questions

Object:

This report is a consequence of the meetings held on June 10th in MELISSA facilities at the UAB.
The target is to answer the raised questions on these meetings, which suggest some modifications or alternatives to the present design and the decision-making will be done taking into account a technical and economical evaluation of the alternatives.

The topics on the table are:

1. Check valve V-410

   This valve is a mistake from old issues of PID
   It should be cancelled.

2. Reactor overpressure due to P-01 and P-06

   Because these pumps are working in a closed loop over the reactor, hydraulically it is not possible to increase the vessel pressure, so they don't need any additional device to limit the pressure of the pumps.

3. Filter sterilization using reverse flow of steam.

   Manufacturers said:
   Hydrophilic cartridges (typically used for liquids): Don't resist reverse flow of steam.
   Hydrophobic (typically used for gases): These cartridges can be sterilized with reverse flow of steam, but requires more careful control than in the forward flow direction. The differential pressure resisted by the cartridge in this direction is smaller.

   Therefore, F-03 should not be sterilized with reverse flow of steam

4. Pressure measurement on top of reactor

   As required of MPP, we have studied to put a manometer on top of reactor. The estimate for this is about 550€

5. Consider the possibility to put the entrance of packing (BIOSTYR) through lower part of bed section.

   We do not find any advantage loading the packing through lower part of bed section instead of through upper part of bed, as it has been designed. Nevertheless, the load through upper part allows refilling the empty chamber that will appear on top of packing bed after to have stopped loading and after to wait for it to settle for a few seconds. Some type of vibration applied on the wall of the reactor can contribute to achieve a good arrangement of the bed.
   Consider both entries is not advisable from sterilisation point of view, since it means to sterilize two lines in parallel and this is never advisable.

6. Revision of sterilization procedure of medium feeding filter F-03

   It was discussed about the possibility of sterilizing together filter F-03 and the pipe between valves V-159 and V-160.It is important to consider that the need of change the cartridge of the filter is the cause of the mentioned activity, and this task will require about 30 minutes for change and sterilization. Therefore, the mentioned pipe can be considered as a part of the reactor itself. On the other hand, must be borne in mind that the life cycle of the cartridge could be about 6 months, or more, if the culture medium is a homogenous solution. So that means a low risk.
   However, what can be done is to minimize the distance between F-03 and the reactor itself, so that this line is a short as possible.

   Also raises discussion about the sterilization of pipe between the bottom of the medium vessel D-03 and the filter F-03. First we must decide when to carry out this operation. It could be the most advisable for doing it whenever vessel D-03 was sterilized.
   On the other hand. We need to distinguish two scenarios for this matter:
   If the used pump is a peristaltic one, the sterilization of this section requires letting out the flexible tube from the clamps of peristaltic pump during sterilization step for allowing flowing the steam through itself. This situation involves a safety risk that you must decide if you want to assume.
   The other scenario involves changing to a diaphragm pump that allows its sterilization in place. This option represents an increase of investment cost of € 2.600, approximately.
   It should be noted that in the event of using pressure (air, N2, etc.) rather than pump the operation would be more secure and reliable and would save the cost of the pump.

   Finally, and in line with the above there arises a discussion on how to improve the safety of not contamination of medium that feeds the reactor. As a result, one might consider installing a second sterile filter in series with F-03, with the possibility of independent sterilization. The increase in cost for this filter with fittings and its corresponding assembly would be in the order of € 2,000 - 2,500, approximately

7. Functional Tests: MPP will define the tests that wishes are carried out with assistance from the manufacturer of SKID.