

TECHNICAL SPECIFICATIONS ACQUEOUS HYDROGEN GENERATOR TYPE BPMP 500-7-EC



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1 - MAIN OPERATING PRINCIPLE

1.1 PREAMBLE

Hydrogen gas is used in more than 80% of worldwide meteorological institutes for weather balloon inflation in Upper-air stations

. The process used for the hydrogen production is based on the electrolysis of water.

The two main technologies used in this process are:

- "Alkaline" technology (*liquid electrolyte in an aqueous solution of potassium hydroxide and deionized water*)
- PEM Technology "" (*Proton Exchange Membrane*) *solid electrolyte polymer membrane PEM*).

SAGIM has these two technologies in its production range.

We offer "PEM" systems only for applications such as research and development, use in laboratory or in the field of renewable energy.

Due to its robustness and simplicity, we favored "alkaline" technology for use in meteorology and adapt our equipment in order to operate safely, whatever the conditions.

However, it is true that today the concept of environment is definitively considered. **SAGIM** remains perfectly aware that "alkaline" technology requires potassium hydroxide (KOH) for the preparation of its electrolyte, which is a highly corrosive agent causing severe burns in case of direct contact with this substance.

Today, SAGIM manufactures new range of generators using **NON CORROSIVE** electrolytic solution under pH neutral.

This generator called "aqueous" offers the major advantage to **not containing** any potassium hydroxide (KOH) or Soda hydroxide (NaOH) in their electrolysis cells.

1.2 ELECTROLYZER OPERATION

The BPMP 500-7-EC generator is composed of 2 electrolysis cells connected in series. Each cell comprises an anode electrode on which oxygen is released and a cathode electrode (the tank) on which the hydrogen is released. Both gases are separated by a diaphragm made with high quality technical cloth.

The positive and negative electrodes are connected to the rectifier by red copper bars 60 x 5.

Hydrogen is produced under atmospheric pressure and conducted to a gas holder. Water traces contented in the hydrogen are collected into a liquid drain trap, then hydrogen goes in the gas holder having a movable bell which fills up during the production. The hydrogen pressure conditioned by the weight of the bell the gas holder will vary between 5 and 8 mbar above atmospheric pressure.

The bell of the gas holder being full, a contact level switch starts the compressor which automatically transfers the hydrogen into the storage vessel.

When the bell is empty, the compressor stops automatically. It will automatically restart when the bell will fully again, this until the storage vessels are full (7 or 8 bar).

At this point, the pressure switch stops the production of hydrogen. The rectifier and the compressor stop instantly.

The oxygen outlet pipe is directly connected to the atmosphere outside the room by a transparent hose.

A water treatment system including a water demineralizer, a demineralized water tank of 25 liters fitted with an automatic filling float valve and 2 automatic level gauges are used to automatically restore the electrolyte level into the both electrolysis cells by adding demineralized water.

1.3 PROCESS OF THE GENERATOR

Refer to process and instrumentation diagram here attached.

1.4 OPERATION OF A GIP™ SINGLE POLE CELL

The GIP™ unipolar cell is based on our experience and service as shown on the process diagram.

Diagram of a single-electrode and single-pole GIP™ electrolyzer



- | | |
|-------------------------------|-----------------------------|
| A: Tank cathode electrode (-) | F: Anode current supply bar |
| B: Anode electrode (+) | H: Hydrogen outlet |
| D: Oxygen gas holder | O: Oxygen outlet |
| E: Gas separator diaphragm | |

Electrolytic solution contained inside the electrolysis cell is a **non-corrosive and environmental friendly** solution with a PH of 7.5 and density of 1.18.

1.5 ADVANTAGES OF A GIP™ SINGLE-POLE CELL

The electrolysis cell model GIP™-M25-EC has been specifically designed to operate under severe applications and can guarantee:

- Higher production reliability minimizing downtime
- Higher maintenance design (less than two (2) hours) to replace a cell
- Instant start up
- Equipment skid mounted for easy installation
- Higher cell shelf life more than 20 years
- Competitive price and economical production cost
- Higher safety explosion-proof design conforms with the customer country norms and training packages

2 - DESIGN OF EQUIPMENT

2.1 DESCRIPTION

NO.	QTY	DESIGNATION
HYDROGEN GENERATOR		
1	1	DC rectifier 12V-750A (set at 585A)
2	1	Single pole electrolyser made up of 2 cells model GIP™ M25-EC serial connected equipped with sensors Hydrogen ATEX certified for automatic demineralized water filling
3	1	Cylindrical gas holder 100 liters with 4 level detectors hydrogen ATEX certified
4	1	Raw water treatment system
5	1	PVC demineralized water tank, 25-liter capacity with automatic float valve
6	2	Liquid drain Vat at inlet and outlet of gas holder
7	1	Single stage hydrogen compressor ATEX certified
8	1	Hydrogen safety relief valve for compressor protection
9	1	Non-return valve compressor exhaust
10	1	Hydrogen ATEX certified pressure switch – H2 production start/stop
11	2	Hydrogen ATEX certified condensate discharge solenoid valve
12	1	Hydrogen storage tank, 1000-liter water capacity, 7-bar working pressure (100 psi) including safety relief valve, isolating valve, drain valve, pressure indicator
13	1	Draw-off panel including reducing valve, draw-off valve and anti-static flexible for filling up balloons
14	140 l.	Non corrosive electrolyte solution
15	1	On line analyzer for measuring the concentration of oxygen in hydrogen
16	1	Flame arrester and explosion proof device for total protection during balloon filling phase
ADDITIONNAL EQUIPMENTS INCLUDED WITH THE GENERATOR		
17	1	Set of piping, fittings and accessories for installation and connection of generator, storage vessel and draw off panel. On line analyzer for measuring the concentration of oxygen in hydrogen
18	1	Set of spare parts for 3 years operation
OPTIONNAL EQUIPMENTS		
19	1	Hydrogen leak detection unit equipped with 2 explosimeter sensor (1 sensor located in the hydrogen generator room ; 1 sensor located in the hydrogen storage room)
20	1	Remote emergency stop unit
21	1	Communication module multi protocol for alarm visualisation via PC, smartphone, tablet...

2.2 ASSEMBLY AND LAYOUT DRAWING

See Drawing here attached

2.3 SPECIFICITY OF THE EQUIPMENT

The hydrogen generator BPMP 500-7-EC has been specifically designed for autonomous hydrogen production dedicated to radiosonde station regardless of environmental conditions.

By its proper design of gas generation system under atmospheric pressure, the generator BPMP 500-7-EC guarantees a perfect seal during production hydrogen gas.

The BPMP 500-7-EC generator offers the following advantages:

- Instantaneous hydrogen production
- Ability to modulate the production of hydrogen from 0 to 100% depending on the real needs
- Start and stop of the unit fully automatic
- Generator designed to operate 24 hours / 24 uninterrupted
- The generator is able to withstand high variations of the mains and also brutal cuts the power supply.
- In case of prolonged mains failure, the generator will wait and restart automatically without any assistance after the mains return.
- Automatic cells demineralized water filling system
- The generator is equipped with a water treatment system with a sufficient reserve to ensure operational autonomy of one week in the absence or failure of the water supply.
- Continuous measuring analyzer oxygen in hydrogen slaved to the generator
- Built-in buzzer for failure warning
- Alarm report terminal block
- Remote alarm system for offset in operating room
- Emergency stop transfer system for offset in operating room
- Generator protected against attacks related to Climatic conditions and saline environments.
- Life of electrolysis cells 20 years

2.4 TECHNICAL SPECIFICATIONS

ITEM	DESIGNATION	SPECIFICATIONS
1	HYDROGEN GENERATOR	
1.1	Hydrogen flow rate at atm. pressure	0,5 Nm ³ /hour (500 Liters/hour)
1.2	Hydrogen pressure in gas holder	5 mbar mini / 8mbar maxi
1.3	Temperature at gas holder outlet	65°C max
1.4	Hydrogen storage pressure	7 or 8 bars
1.5	Hydrogen storage volume	7 or 8 m ³ (for storage vessel 1000 litres)
1.6	Hydrogen purity	99.9% at 20°C ambient temperature
1.7	H ₂ temperature at storage vessel exhaust	40°C Max
1.8	Cooling system	Natural air
1.9	Monitoring system	Fully automatic

ITEM	DESIGNATION	SPECIFICATIONS
2	HYDROGEN GENERATOR CONFIGURATION	
32.1	Electrolyser	2 GIP™ monopolar cells type M25-EC serial connected
2.2	Rectifier	Type MICROSWITCH – MIS 108 – Regulation by IGBT
2.3	Gas holder	Type 100L – equipped by 4 limit switches - ATEX certified H2
2.4	compressor	Type NV 17 K – single stage - ATEX certified H2
2.5	Size (L x W x H)	1.750 x 1.250 x 1.800 mm
2.6	Weight	1100 Kg.
3	UTILITIES	
3.1	Standard electrical power supply	3 x 400 VAC -10%/+15 % Three Phase 50/60 Hz +/- 2 %
3.2	Single phase power supply (On demand only)	240 VAC -10%/+15% Single Phase 50/60 Hz +/- 2%
3.3	Input current on cell	580A
3.4	Input voltage on cell	2.3 VDC per cell
3.5	Electricity consumption	Std 8 kVA – Max 9.5 kVA – Mini 5.5 kVA (Three phase power supply) Std 11 kVA – Max 13 kVA – Mini 7 kVA (Single phase power supply)
3.6	Water consumption	1 liter of water per m ³ of hydrogen produced
3.7	Required quality of water	Raw / rain / tap water– pressure minimum 0.5 barg
4	HYDROGEN STORAGE (vertical type)	
4.1	Water capacity	1000 liters
4.2	Storage gas volume	7 Nm3
4.3	Proof pressure	EN standard (1.43 x service pressure according to PED)
4.4	Service pressure	Nominal: 7 bars - Max. : 8 bars
4.5	Overall size	Ø 850 mm - height: 1 2.150 mm
4.6	Weight	230 Kg.
4.7	Fluid allowed	Hydrogen gas
4.8	Conformity	European standards
5	HYDROGEN GENERATOR OPERATING ENVIRONMENT	
5.1	Ambient relative humidity	0 – 100 %
5.2	Altitude range	Sea level to 1000 m
5.3	Ambient air temperature range	0 to 50 °C
5.4	Stress and climatic conditions	Tropical – saline atmosphere
5.5	Operating Conditions	Indoor

2.5 LINK, CONNECTION AND TRANSFER

Connection and network connection of water

The connection of the water circuit of the generator to the connection point of the building is carried out by flexible connection ø12 mm.

The water supply of the building must be equipped with a ball valve (1/4 turn) and a male thread 1/2 "BSP.

Gas connection and network connection

The gas connection from the generator to the storage tank and from the storage tank to the draw off panel is performed by connecting copper pipes ø14 mm. The connection is made by brass union with olive

The gas filling connection table to balloon inflation device is provided by flexible antistatic ø 8 mm

The draw off panel is provided with a pressure regulator / flow (P 2 bars / Q: 120 m³ / h)

3 - MAINTENANCE

3.1 STRATEGIC SPARE PARTS FOR A THREE YEAR OPERATION (OPTION)

The set of spare parts listed below is proposed as optional. This set ensures operation of the equipment for a period of 3 years.

NO.	QUANTITY	SPARE PARTS LIST FOR 3 YEARS
1.	ELECTROLYZER	
1.1	2	EPDM rectangular cell bell seal
1.2	10	EPDM : 2 diaphragm bell seal, 2 cell cover seal, 1 O2 outlet tube seal
1.3	4	PTFE insulator : Diaphragm Bell/Cell cover
1.4	6	PTFE Cell cover insulator
1.5	2	EPDM drain plug seal
1.6	1	EPDM particle filter seal
1.7	2	EPDM filling plug seal
1.8	2	Level gauge glass
1.9	4	PTFE/EPDM level gauge glass seal
1.10	1	Alumina load cartridge for particle filter
1.11	2	Water filter boby
2.	CURRENT RECTIFIER	
2.1	1	PCB regulator (MS-DEC 1021 G3)
2.2	1	PCB Power supply (MS ALIM 1028 F1)
2.3	2	PCB driver (IGBT
2.4	1	Primary bridge
2.5	1	IGBT
3.	GAS HOLDER	
3.1	1	Level contact switch
4.	DEMINERALIZED WATER UNIT	
4.1	1	Resin refill
5.	HYDROGEN COMPRESSOR	
5.1	1	Set of seal / gaskets
5.2	1	Set of 4 valves
5.3	2 litres	Compressor oil

3.2 DAILY CHECKS

NO.	DAILY CHECK	FREQUENCY
1	Level of electrolyte in cell	1
2	Check of oxygen content in hydrogen	1
3	Check the water level in the drain vats of the gas holder	1
Note	During checks or measurements, the electrolyzer <u>does not</u> have to be stopped	

3.3 PREVENTIVE MAINTENANCE

NO.	PREVENTIVE MAINTENANCE	FREQUENCY
1	Drain the hydrogen compressor oil	12 months
2	Replacement of the alumina load in the particle filter	12 months
3	Replacement of the resin in the water treatment system	12 months
4	Greasing of the central guide of the gas holder	12 months

Note

The spare parts list and timetable for checks and maintenance have been drawn up on the basis of operation of the unit at 8,000 hours per year.

The tooling required for the commissioning and maintenance of the equipment is included in the scope of supply.

4 - SAFETY

4.1 SAFETY OF EQUIPMENT

- o A hydraulic safety valve is fitted at the inlet and outlet of the gas holder in order to protect the cells against any over pressure in the generator.
- o The generator is equipped as standard with an oxygen analyzer ensuring supervision of good functioning of cells.
- o The hydrogen compressor is provided with a safety valve set at 9 bar preventing any risk of Over-pressurization of the compression head and casing.
- o The high pressure circuit is protected by a safety valve set at 1 bar above the nominal pressure storage.
- o Automatic production stop in the event of production failure and signaling alarm alert local and distance (300 m) if:
 - O₂ concentration \geq 1% in H₂*
 - Failure of compressor operation (FDC TH on gasometer)*
 - Electrolyte level too low in one electrolysis cell*
 - Power supply failure of the analyzer*
- o emergency stop device production

4.2 REGULATION

4.2.1 Conformity

The entire system complies with European standards for explosive atmosphere. (See table below standards applied)

ITEM	DESIGNATION	CONTROL	DOCUMENTS	STANDARD OR NORM
0	Hydrogen Generator	Manufacturing	International standard	ISO 22 734 - 1
1	Current rectifier	Manufacturer test	Test records	Standard Supplier
		EC Compliance	Declaration of conformity	E.M.C 2004/108/CE L.V. 2006/95/CE
2	Electrolytic cell vat	Matter / <i>Matière</i>	Matter certificate	Standard Supplier
		Welding and conformity	Visual welding and conformance certificate	SAGIM Standard
		Tightness	Testing Penetrant certificate	SAGIM Standard
		Tightness	Tightness control certificate	SAGIM Standard
		Welding	Welder qualification certificate	NF EN 287-1 : 2004
3	Complete electrolytic cell	Cell mounting conformity	Step control list to be performed	SAGIM Standard
4	Gas holder 100 liters	Conformity and operating test	Conformance certificate and operating test certificate	SAGIM Standard
		Tightness	Tightness control certificate	SAGIM Standard
		Welding	Welder qualification certificate	NF EN 287-1 : 2004
5	Hydrogen Compressor	Specifications, performance and operating	Specifications, performance and	SAGIM Standard
			Test Certificate	Standard Supplier 12002437/CE/1
		EC Compliance	Declaration of conformity	NFL 00.015

ITEM	DESIGNATION	CONTROL	DOCUMENTS	STANDARD OR NORM
6	Compressor motor	EC Compliance	Declaration of conformity	PTB 10-ATEX-1028 X DIRECTIVE 94/9/EC
7	BP-MP 500/7-EC Assembling	Assembling conformity	Step control list to be performed	SAGIM Standard
8	Limit switch for gas holder	EC Compliance	Declaration of conformity	ATEX + 94/9/CE Standard
9	Solenoid valve for discharge compressor	EC Compliance	Declaration of conformity	LCIE 03 ATEX 6451 X/04 LCIE 02 ATEX Q 8034
10	Pressure switch	EC Compliance	Declaration of conformity	ATEX + 94/9/CE Standard
11	Analyzer OXN 102	Calibration and test	Calibration and test certificate	SAGIM Standard
12	Oxygen pipe	Degreasing	Degreasing certificate	SAGIM Standard
13	BP-MP 500/7-EC generator	Painting specification	Specification painting certificate	SAGIM Standard
14	Packaging	Shipping identification marks	Packaging control certificate	SAGIM Standard
15	Hydrogen Storage vessel 1000 litres	Trial test	Trial test certificate	PED (DESP) 97/23/CE + Decree N° 99-1046 of 13/12/1999
16	BP-MP 500/7-EC generator	Factory acceptance	Factory Acceptance Test Certificate (FAT)	SAGIM Standard according to „Trial test procedure“

4.2.2 Agreements and certifications

The Electrolytic hydrogen generator type BPMP 500-7-EC complies with the international standard ISO 22734-1 dated 01/07/2008 building on hydrogen generators using the water electrolysis process; Part 1: Industrial and commercial applications

All electrical components comply with the Low Voltage Directive 2006/95/EC of 12/12/1995, the Electromagnetic Compatibility Directive 2004/108/EC of 15/01/2004 and the ATEX Directive 94/9/EC of 23/04/1994

All pressurized components comply to the European Directive 2014/68/UE dated 01.07.2016 and to the legislation of the Member State of the European Union on the transposition of EU directives.

4.3 ELECTROMAGNETIC COMPATIBILITY (EMC)

All constraints of EMC have been taken into account for all electrical components constituting the electrolytic hydrogen generator.

All metal parts constituting the electrolytic hydrogen generator, a storage tank, and draw off panel as well as copper pipes link are ground connected.

Para arrester installed at the head of the line shall protect against lightning protection, the general power of hydrogen generation system and its additional components.

The possible establishment of a system of prevention / lightning detection, lightning or any other device for protection against lightning is not included in the supply and remains, therefore, the responsibility of the operator

4.4 USER AND TRAINING MANUAL

A technical and detailed manual is provided in duplicate with the equipment. This manual includes the following parts:

Various installation instructions, storage and security

- Procedures for the first start, daily start and start following maintenance or an extended shutdown

Procedures relating to routine maintenance

Various site plans, components and maintenance support

Various electrical drawings and diagrams

Scheme detailed process

Etc..

5 – SAGIM CUSTOMER SERVICE

5.1 INSTALLATION AND SERVICE ON SITE

5.1.1 Services included

The installation, preliminary testing and performance, safety check and a specialist engineer SAGIM provides final commissioning of the hydrogen production unit.

The estimated delivery time is 8 calendar days and is distributed as follows:

- 2 days for the return trip
- 5 working days on site (based on 8 hours per day) for the installation, startup and commissioning of equipment including:
 - *Positioning of electrolytic hydrogen generator, the storage tanks 3 and table racking*
 - *The completion of the copper piping, installation and connection of various devices*
 - *The electrical connection of the hydrogen generator*
 - *Preliminary, intermediate and final tests*
 - *The leak testing*
 - *The final commissioning of the system*
- 1 day training staff in charge of the generator.

5.1.1 Exclusions

A client performs the operations described below, namely:

- The transport and handling of equipment from the storage area to the client hydrogen building
- The positioning of equipment in their location in the building of hydrogen
- Devices for grounding the building hydrogen
- The connection to grounding of all metal parts as metal doors, metal frames included in the construction of the building and the hydrogen generator frame hydrogen
- The supply of the power supply cable of the hydrogen and the connection of the latter unit in the three phase power Client
- The installation of gutters drain:
 - Water from the overflow drain pots gasometer*
 - To purge the "overflow" of the tank gasometer*
 - Points purge compressor output filters*
- The remuneration of local staff to support the handling and installation of equipment

6 - QUALITY INSURANCE

All our services, beginning with the order and following through to the commissioning of our installations at Customers' as well as the development stage, production, installation and after-sales service at Customer are **ISO 9001-ed: 2015** quality certified.



**COMPANY WITH
QUALITY SYSTEM
CERTIFIED BY DNV GL
= ISO 9001 =**

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificat N°:/Certificate No.: 77577-2010-AQ-FRA-COFRAC Rev.5 Certificat valable depuis le/Initial date: 15 janvier 1993 Dates de validité:/Valid: 21 mai 2019 - 01 juin 2022

Ceci certifie que le système de management de la société /This is to certify that the management system of

SAGIM

35, Rue Scheurer-Kestner, 42000, Saint-Etienne, France

a été jugé conforme à la norme de système de management de la Qualité /
has been found to conform to the Quality Management System standard:

ISO 9001:2015

La validité de ce certificat couvre
les produits ou services suivants :

Conception, fabrication, vente et mise en service d'appareils de génération d'hydrogène. Prestation de formation et support technique aux clients. Négocier de consommables et accessoires météorologiques.

This certificate is valid
for the following scope:

Design, manufacturing, sale and commissioning of equipments for generating hydrogen. Providing training and technical support to customers. Trading meteorological consumables and accessories.

Lieu et date/Place and date:
Genas, 22 mai 2019



CERTIFICATION
DE SYSTEMES
DE MANAGEMENT
ACCREDITATION
N°4 - 008

Porteur de plainte le voir sur www.cofrac.fr

Pour l'Organisme de Certification /
For the Certification Body
DNV GL - Business Assurance
Parc Everest, 54 Rue Marcel Dassault,
69740, Genas, France

Estelle Mailler
Représentante de la Direction /
Management Representative

La non-respect des conditions énoncées dans l'accord de certification peut rendre ce certificat invalide/
Lack of fulfillment of conditions as set out in the Certification Agreement may render this Certificate invalid.
Organisme accrédité: DNV GL Business Assurance France, Parc Everest, 54 Rue Marcel Dassault, 69740, Genas, France.
TEL: +33 (0)4 78 90 91 40. www.dnvgl.fr/certification

7 - TRAINING ON SITE

At the end of the installation and commissioning of the system, training is provided to enable staff to ensure the operation and routine maintenance of the system, namely:

- Use and supply of the system
- Monitoring and verification of the system
- Management of alarms and vents
- Safety procedures
- Periodical operations & maintenance

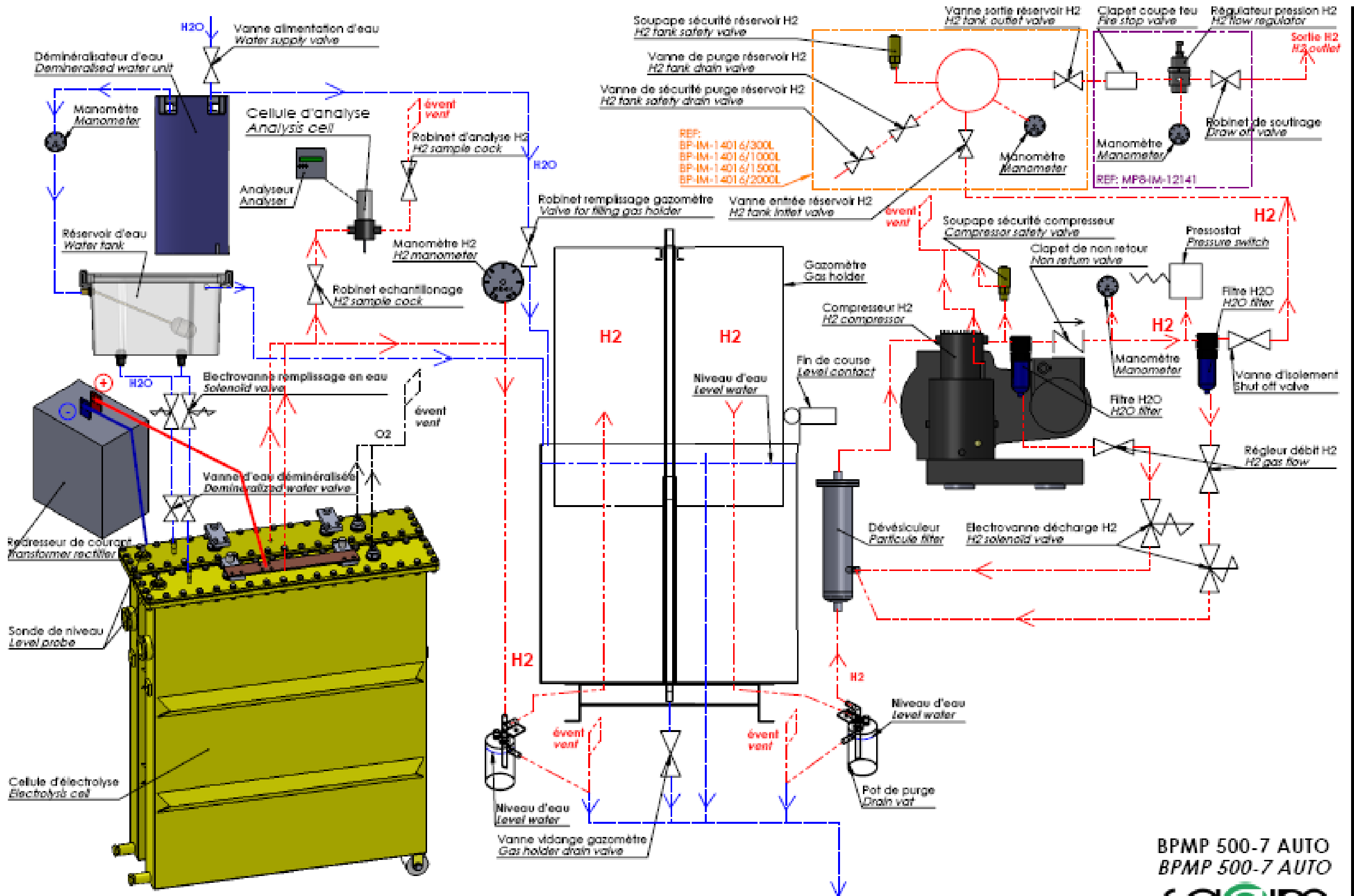
It is held up on one day according to the following program:

- A. *Introduction to the Company*
- B. *Description and operating principle of generator*
- C. *Generator layout*
- D. *Safety, gas, installation instructions*
- E. *Design of a hydrogen generator*
- F. *Role of the current rectifier*
- G. *Role of the electrolyzer*
- H. *Design of an electrolytic cell and role*
 - a. *Anode*
 - b. *Cathode*
 - c. *Diaphragm*
 - d. *Electrolyte*
 - e. *Electrical insulation*
- I. *Design of the current rectifier*
- J. *Design of electrolyzer*
- K. *Purity of hydrogen*
- L. *Role of analyzer*
- M. *Design of analyzer*
- N. *Calibration of analyzer*
- O. *Preparation of unit before start up*
- P. *Practice*
- Q. *Commissioning*
- R. *1st time start up of unit*
- S. *Operation of unit*
- T. *Periodical operations*
- U. *Handling and start up of unit by trainees*
- V. *Maintenance of the plant*
- W. *Breakdowns, causes and remedies*
- X. *Troubleshooting of unit by trainees*
- Y. *Different questions*
- Z. *Written examination*

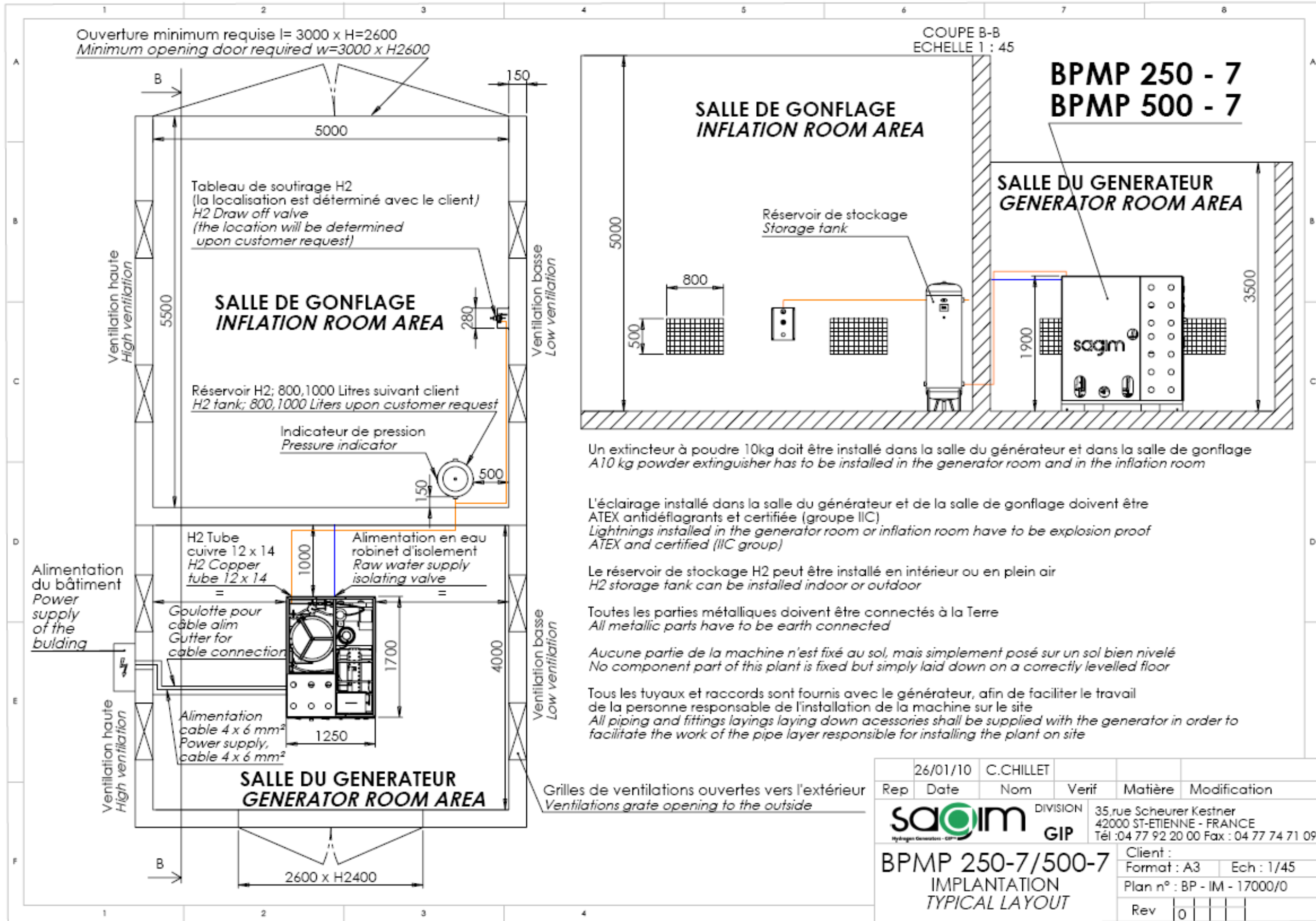
8 – ANNEX

- ☒ ANNEX N°1: Process Diagram
- ☒ ANNEX N°2: General Layout Drawing
- ☒ ANNEX N°3: General Assembly Drawing

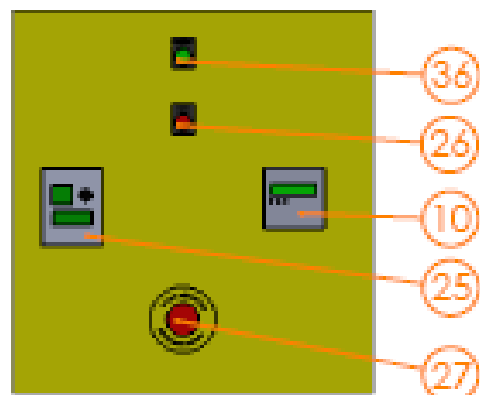
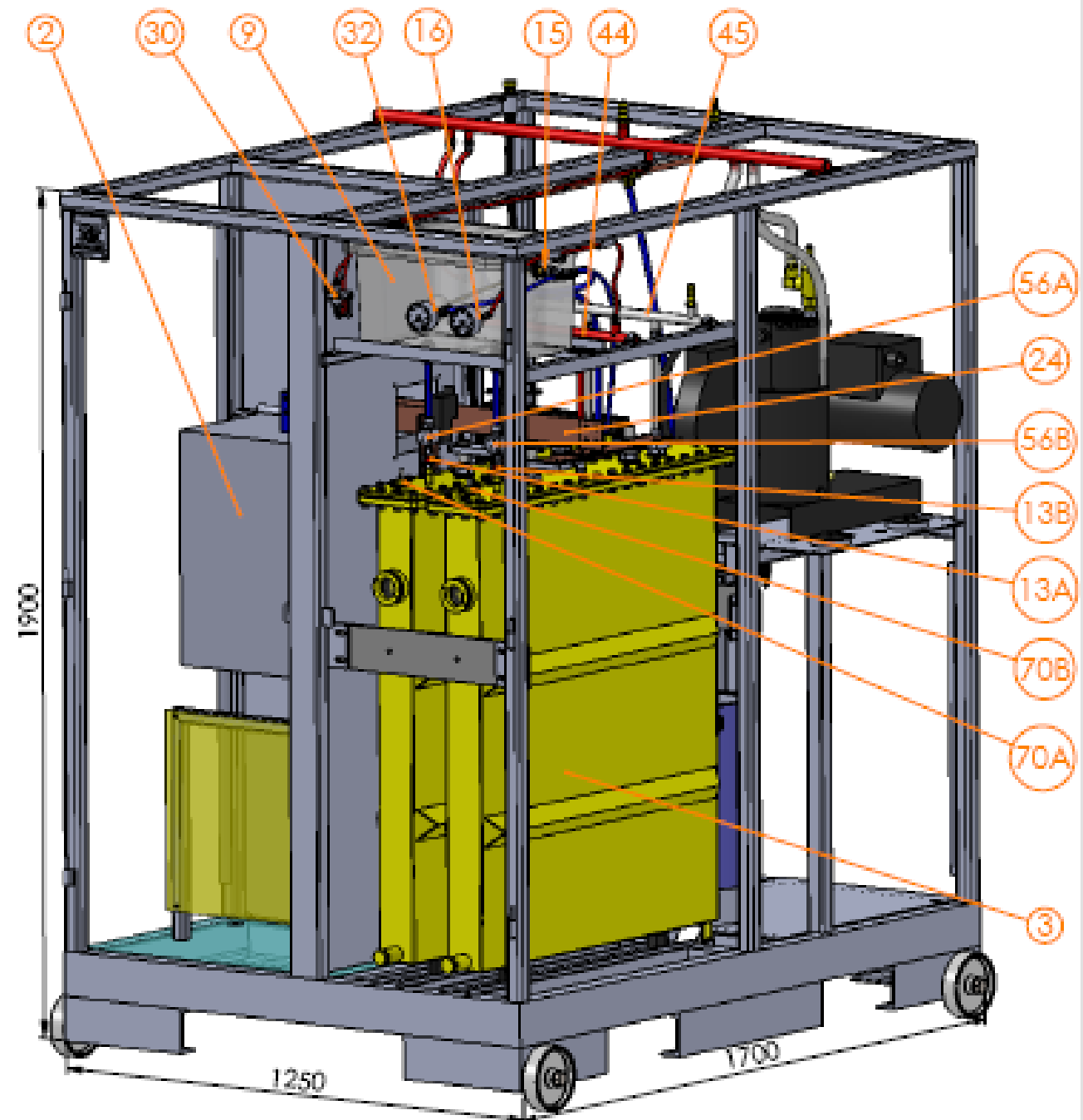
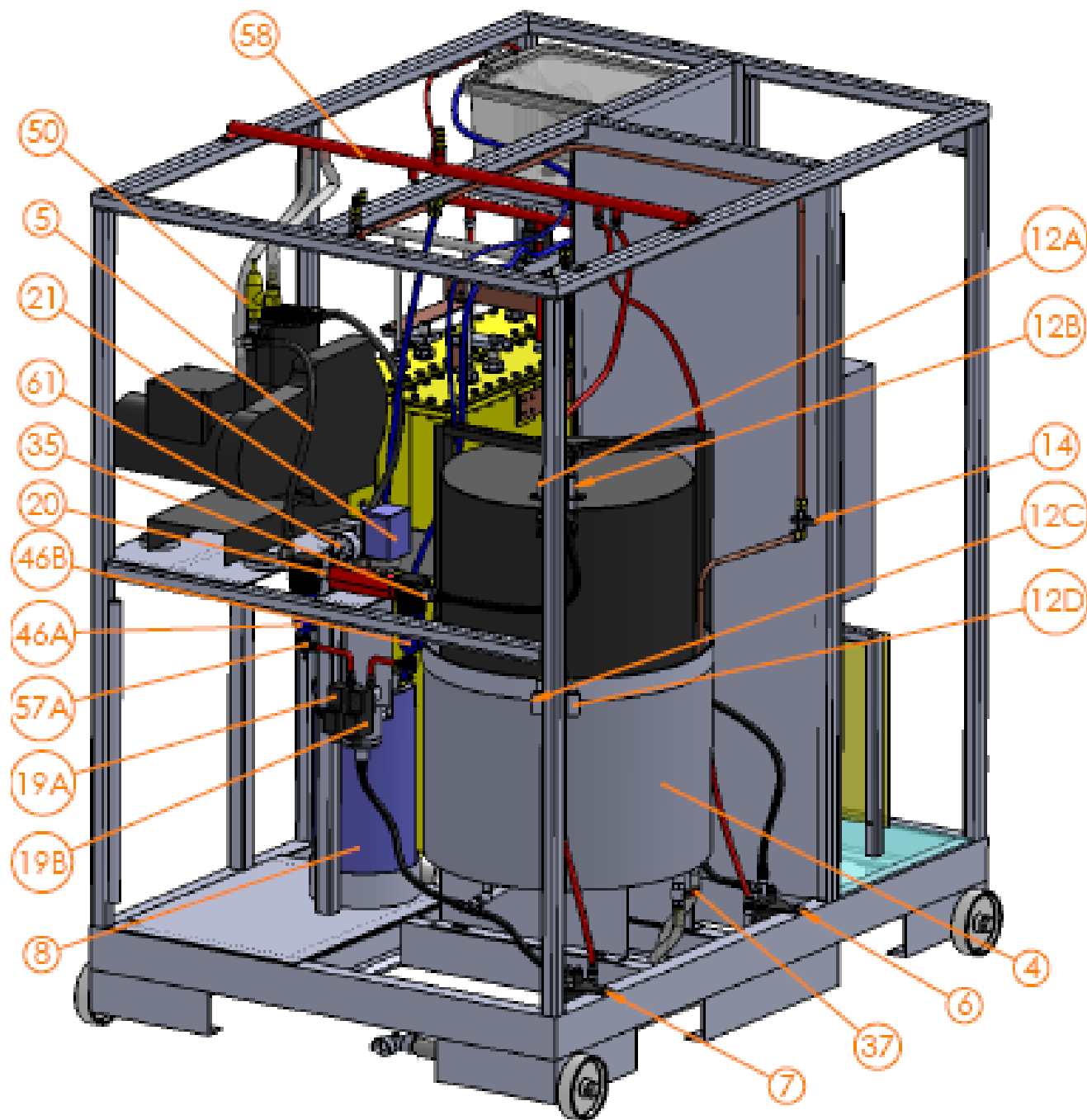
ANNEX N°1 : BP MP 500-7-EC PROCESS DIAGRAM



MP 500-7-EC GENELAYOUT DRAWING



ANNEX N° 3 : BP MP 500-7-EC GENERAL ASSEMBLY DRAWING



27/01/16	C.CHILLET			Sonde de niveau sur cuve
21/09/15	C.CHILLET			Mano REP61
17/08/15	C.CHILLET			
Rep	Date	Nom	Verif	Modification
		DIVISION GIP		35,rue Scheurer Kestner 42000 ST-ETIENNE - FRANCE Tél :04 77 92 20 00 Fax : 04 77 74 71 09
BPMP 500 - 7 AUTO ENSEMBLE				
Client :				
Format : A3		Ech : 1/12		
Plan n° : BP-IM-18000 - Z AUTO				
Rev. 0 1 2				

70B	1	Sonde de niveau - Level probe
70A	1	Sonde de niveau - Level probe
61	1	Manomètre 0-10 Bars - Manometer 0-10 Bars
59	1	Collecteur eau - water collector
58	1	Collecteur évent H2 - H2 vent collector
57B	1	Régleur débit H2 électrovanne décharge sortie H2 - H2 outlet adjuster gas flow discharge solenoid valve
57A	1	Régleur débit H2 électrovanne décharge entrée H2 - H2 inlet adjuster gas flow discharge solenoid valve
56B	1	Electrovanne remplissage en eau - Water filling solenoid valve
56A	1	Electrovanne remplissage en eau - Water filling solenoid valve
50	1	Soupape sécurité compresseur - compressor safety valve
46B	1	Filtre H2O sortie - H2O Filter outlet
46A	1	Filtre H2O entrée - H2O Filter inlet
45	1	collecteur O2 (blanc) - O2 collector (white)
44	1	collecteur H2 (rouge) - H2 collector (red)
37	1	Vanne vidange gazomètre - Gas holder drain valve
36	1	Voyant vert "Présence secteur" - Green light "Mains On"
35	1	Vanne d'isolement réservoir - Shut off valve
34	1	Vanne alimentation en eau - Water supply valve
33	1	Manomètre eau pure 0-10 Bars - Demineralized water pressure gauge 0-10 Bars
30	1	Robinet analyse H2 - H2 purge cock
27	1	Arrêt d'urgence - Emergency stop
26	1	Voyant rouge "Alarme" - Red light "Alarm"
25	1	Panneau de contrôle redresseur - Rectifier control panel
24	1	Jeu de barre de courant - Set of current bar
23	1	Dévéscaleur - Particle filter
22	1	Robinet échantillonnage analyse / H2 sample cock
21	1	Pressostat - Pressure switch
20	1	Clapet de non retour - Non return valve
19B	1	Electrovanne décharge sortie H2 - H2 outlet Solenoid valve
19A	1	Electrovanne décharge sortie H2 - H2 inlet solenoid valve
16	1	Manomètre H2 0-40 mBar - H2 pressure gauge 0-40 mBar
15	1	Système chaise d'eau - floating valve for demineralized water
14	1	Robinet remplissage gazomètre - Valve for filling gas holder
13B	1	Vanne d'eau déminéralisée - Demineralized water Valve
13A	1	Vanne d'eau déminéralisée - Demineralized water Valve
12D	1	Fin de course très bas - Level contact low low (LSLL) compressor safety
12C	1	Fin de course bas - Level contact low (LSL) stop compressor
12B	1	Fin de course très haut - Level contact high high (LSHH) start compressor, stop rectifier
12A	1	Fin de course haut - Level contact high (LSH) start compressor
11	1	Cellule pour analyse O2 dans H2 - Cell for analysis O2 in H2
10	1	Analyseur O2 dans H2 - Analyser O2 in H2
9	1	Réservoir d'eau déminéralisée - Demineralized water tank
8	1	Déminéralisateur - Demineralized water unit
7	1	Pot de purge - Drain vat
6	1	Pot de purge - Drain vat
5	1	Compresseur H2 - Compressor H2
4	1	Gazomètre H2 100 Litres - Gas holder H2 100 Liters
3	2	Cellule d'électrolyse M25 (250L/h) - Electrolysis cell M25 (250L/h)
2	1	Redresseur de courant 750A / 8V - Transformer rectifier 750A / 8V
1	1	Platine électrique - Electrical panel

Rep Quantité Designation

X	27/01/16	C.CHILLET	Sonde de niveau cuve
X	21/09/15	C.CHILLET	Manomètre-manometre rep 61
X	17/08/15	C.CHILLET	

Rep Date Nom Verif Modification



DIVISION
GIP

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**BPMP 500 - 7 AUTO
ENSEMBLE**

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