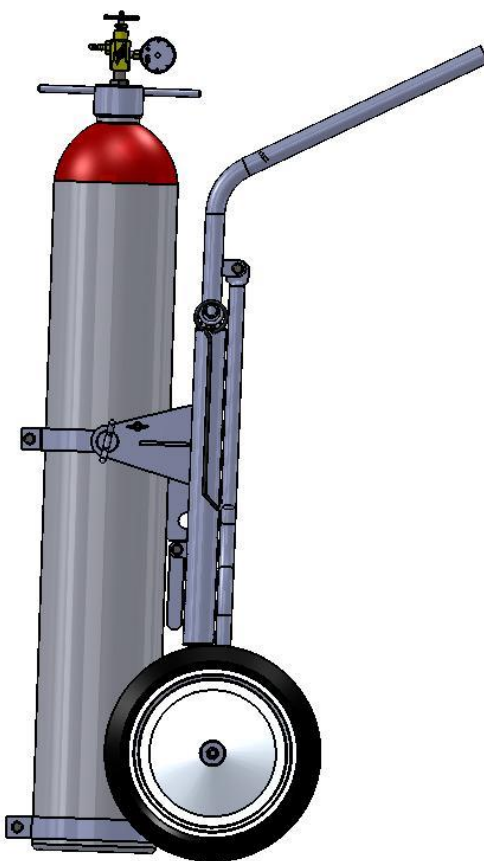


TECHNICAL SPECIFICATIONS

FOR CHEMICAL HYDROGEN GENERATOR

TYPE GIP™ 3



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1 - GENERALITIES AND PRINCIPLE

The GIP™ 3 type hydrogen generator, manufactured by SAGIM, is an easily operated unit suitable throughout the world.

Its production per charge is 3 m³ of hydrogen (measured dry at 15°C and 760 mm of mercury).

The preparation procedure of the hydrogen required for the GIP™ 3 type hydrogen generators is based on a high-pressure, high-temperature attack of the silicon by caustic potash in an aqueous solution.

With this in mind, we advise the use of dosed charges made by us for the following reaction:



The caustic soda is, therefore, subject to the action of the silicon in the autoclave.

The pressure is produced by the reaction itself which is not reversible. The local increase of temperature enables the liquid to reach a temperature high enough to substantially compensate for the retarding effect of the pressure and ensure the complete attack of the silicon.

2 – EQUIPMENT DESIGN

2.1 DESCRIPTION

The GIP™ 3 type hydrogen generator unit is comprised of the following:

- the generator,
- a trolley (for accessibility to the generator),
- a set of accessories.

2.1.1 The generator

- a) The body of the GIP™ 3 type hydrogen generator is comprised of a cylinder made of drawn seamless steel with a capacity of approximately 45 liters, pressure tested to 300 bars, and stamped at 200 bars by the 'Service des Mines'. This cylinder is shrink-fitted at the bottom and has a neck with external threads.

The middle has a steel two-part ring assembled by bolts with pivots at two diametrically opposed points enabling it to swivel on the trolley and a hook for it to be locked on to the cylinder in respect to the trolley.

- b) The threaded neck of the cylinder has a cap screwed onto it. This special patented system provides sealed closing due to a set of rubber locking washers.
- c) The top part of the cap has a hydrogen draw-off cock equipped with an end piece on which a flexible hose is adapted to draw off the hydrogen, a safety burst type valve, and a pressure gauge. The bottom part of the cap has a chain with a suspended basket made of perforated sheet metal and provided to hold the silicon charge.

2.1.2 The trolley

The trolley mainly includes a cradle made of tubular steel, two rubber-coated wheels, and a prop stand.

The wheels are comprised of two side plates made from bolted sheet metal, a hub and solid rubber tread for wheeling over all types of terrain.

2.1.3 The accessories

Housed in a wooden box, the accessories include:

- a) One bucket with lip designed to measure the quantity of water required for the reaction and to take the waste liquid when draining the unit,
- b) One large bent funnel to add alkaline charge, powdered silicon and water to the generator,
- c) One small funnel to fill the basket with crushed silicon,
- d) One scoop to facilitate the silicon handling,

- e) One poker,
- f) One spanner to operate the nut of the closing cap and change the disk of the burst valve,
- g) One set of earthing connecting cables including:
 - one earth cable 4 mm² length 20.00 m,
 - one earth cable 4 mm² length 10.00 m,
 - one earth cable 4 mm² length 1.10 m,
- h) One pair of goggles,
- i) One pair of gloves,
- j) One brush,
- k) One technical booklet.

2.2 DRAWING

See Annex here after

2.3 TECHNICAL SPECIFICATIONS

NO.	DESCRIPTION	SPECIFICATIONS
1	HYDROGEN GENERATOR	
1.1	Hydrogen volume	3 m ³ at 15°C
1.2	Hydrogen storage pressure	130 to 140 bars (apparatus hot) 100 bars (apparatus cold)
1.3	Water consumption	13 liters per GIP cartridge
1.4	Water quality required	Raw water – Sea water allowed
1.5	Water temperature required	Min : 15°C – max 35°C
2	HYDROGEN GIP CYLINDER	
2.1	Water capacity	45 liters
2.2	Storage gas volume	3 m ³
2.3	Proof pressure	according to PED 1.43 x max service pressure
2.4	Service pressure	Nominal: 130 bars - Max. : 200 bars
2.5	Overall size	Width 705 mm - height: 1 1575 mm - Depth: 895 mm
2.6	Weight	113 Kg.
2.7	Fluid allowed	Hydrogen gas
2.8	Conformity	European standards – PED 97/23/EC
3	HYDROGEN GENERATOR OPERATING ENVIRONMENT	
3.1	Ambient relative humidity	0 – 100 %
3.2	Altitude range	Sea level to 1000 m
3.3	Ambient air temperature range	0 to 50 °C
3.4	Stress and climatic conditions	Tropical – saline atmosphere
3.5	Operating Conditions	Indoor & outdoor

2.4 GIP™ 3 INFORMATION ON METEOROLOGICAL BALLOONS

The GIP™ 3 type hydrogen generator cartridges are stored in waterproof plastic boxes made of quantitative dosage of:

- alkaline cartridge
- priming cartridge
- granulated silicon cartridge

A manipulation allows the generation of a hydrogen volume enough to inflate one 600 gr. balloon.

After the gas take-off phase, the generator has to be emptied and rinsed with water.

Immediately after the rinse with water, it is ready for a new operation. If necessary, a production of hydrogen can be made every two hours.

In other words, a 600 gr. hydrogen balloon can be inflated every two hours with the GIP™ 3 type hydrogen generator.

3 - MAINTENANCE

3.1 SPARE PARTS LIST (Optional)

QUANTITY FOR 1 YEAR	QUANTITY FOR 2 YEARS	<i>DESIGNATION OF SPARE PARTS</i>
1	2	<i>Adjustable Spanner</i>
0	1	<i>Closing ensemble (axle and washer only)</i> (drawing ME-15003 détail 8,18,16)
0	1	<i>Draw-off cock</i> (drawing ME-15003)
1	1	<i>Straight funnel for filling the basket with silicon</i> (drawing ME-15004)
1	1	<i>Bent funnel for filling the generator</i> (drawing ME-15004)
2	2	<i>Set of 7 EPDM gaskets for the closing</i> (drawing ME-15003 détail 17)
1	2	<i>Pressure gauge ø 60 mm</i>
1	2	<i>Silicon basket</i> (drawing ME-15004 détail 2)
1	2	<i>Shovel</i>
1	3	<i>Set of gaskets for draw-off cock with bursting disk</i> (drawing ME-15003 détail 9,10,11,12,13,14,15)
1	1	<i>Poker</i> (drawing ME-15004 détail 3)
1	2	<i>Bucket (13 liters)</i>

3.2 DAILY CHECKS

DAILY CHECK	FREQUENCY
Cleaning and brushing of the threaded cap	Before every operation
Greasing of the generator neck and of the threaded cap	Before every operation
Safety disk	Before every operation

3.3 PREVENTIVE MAINTENANCE

For preventive maintenance, the safety disk must be changed every 12 months.

4 - SAFETY

4.1 SAFETY OF EQUIPMENT

A safety valve is provided on the closure system of the chemical generator to avoid any build up of pressure in the generator.

Agreements and certifications

The Chemical hydrogen generator type GIP 3 complies with the European Directive 97/23/EC of 29.05.1997, the legislation of the Member State of the European Union, on the transposition of EU directives above Decree n ° French State 991046 of 13.12.1999 and that the regulations defined by Annex I of the European Directive

4.2 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 - 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.



DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

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

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. Négoce 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 disponible 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 Maillier
Représentante de la Direction /
Management Representative

Le 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

6 - REACTIVE CARTRIDGES

The GIPTM reactive cartridges are in compliance with the technical clauses for cartridges for GIPTM no. 491 generators of the "Météorologie Nationale" department.

6.1 THE CARTRIDGES

The complete cartridge for the production of 3 m³ of hydrogen per operation using GIPTM 3 type hydrogen generators mainly includes:

- o Alkaline cartridge
- o Priming silicon cartridge
- o Silicon cartridge

The special patented alkaline cartridge comprised of a eutectic mixture of caustic soda and potash, not giving any solid residue, is housed in a sealed plastic box.

The same applies for the priming silicon cartridge which has the bare quantity required to cause the reaction.

The cartridge of granulated silicon, called the production cartridge, is supplied in a plastic bucket. The dosage depends on the actual capacity of the generator's metal basket.

Supplying the products required for the hydrogen production in this way eliminates any risk of error while at the same time simplifies the handling by eliminating weighing operations.

6.2 THE PACKING

For the transport, the reactive cartridges are housed in wooden boxes 18-mm thick, strapped twice for 6 alkaline cartridges and 6 priming cartridges housed in the same box. The granulated silicon cartridges, called production cartridges, are housed in one plastic buckets each with 12 cartridges. Therefore, 2 boxes of 6 alkaline cartridges are required to use one bucket of 12 cartridges of granulated silicon.

The boxes containing 6 alkaline cartridges and 6 priming cartridges have the following features:

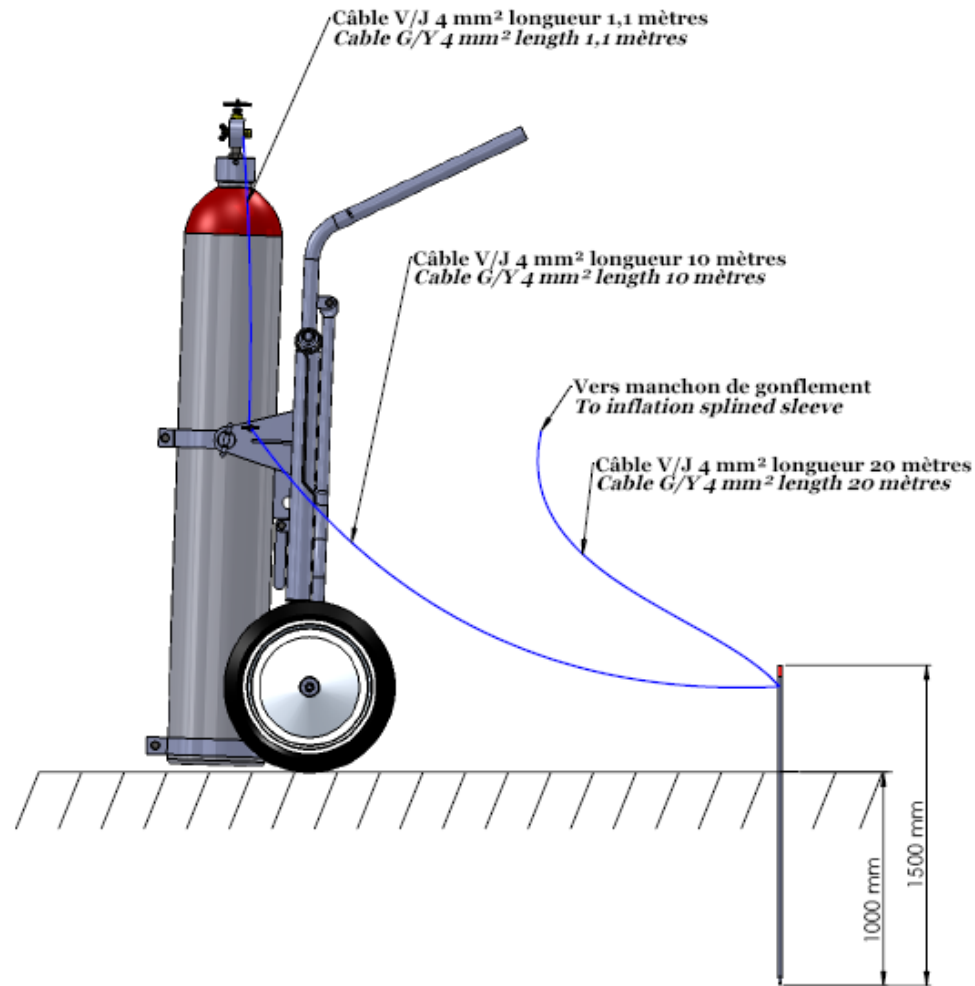
- a) Dimensions 0.55 x 0.40 x 0.30
- b) Gross weight 35 kg
- c) Net weight: 23 kg

The metal buckets containing 12 granulated silicon cartridges have the following features:

- a) Dimensions 0.33 x 0.33 x 0.26
- b) Gross weight 20 kg
- c) Net weight 18 kg

7 – ANNEX

MISE A LA TERRE DU GENERATEUR GENERATOR EARTHING DEVICE



LOT D'ACCESSOIRES ACCESSORIES SET

Entonnoir coudé
Bent funnel



Entonnoir droit
Straight funnel



Seau jaugeur
Bucket



Pelle
Scoop



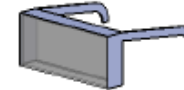
Poussoir
Poker



Clé à molette (12")
Spanner (12")



Paire de lunettes
Pair of goggles



Paire de gants
Pair of gloves



Brosse laiton
Brass brush



Piquet de mise à la terre
Earth rod



Jeu de câbles pour mise à la terre
Set of earth connecting cables



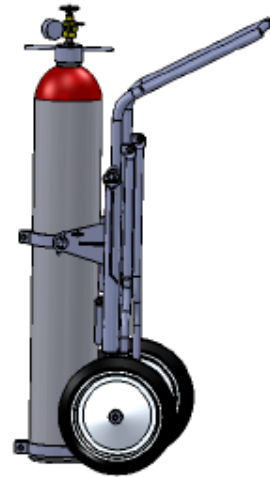
Câble V/J 4 mm² Lg: 1,1m-10m-20m
Cable G/Y 4 mm² Lg: 1,1m-10m-20m

Notice d'exploitation et d'entretien
Technical booklet

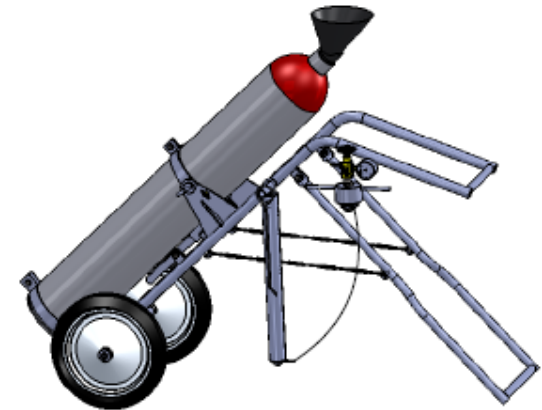


GENERATEUR CHIMIQUE TYPE GIP™ 3 CHEMICAL HYDROGEN GENERATOR TYPE GIP™ 3

UTILISATION
USE

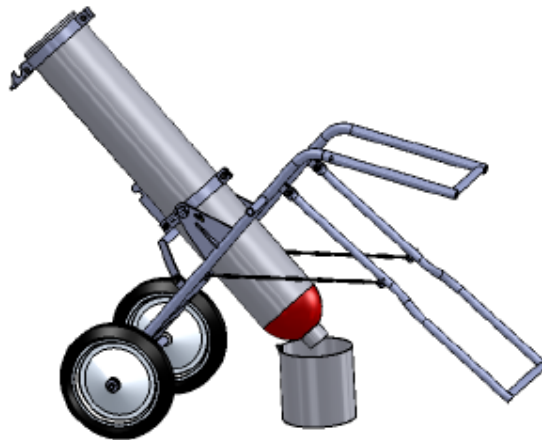


CHARGEMENT
CHARGING

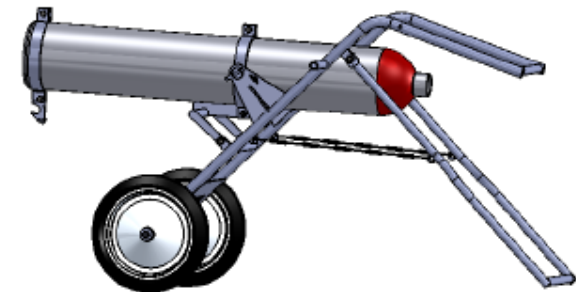


- 3m³ d'hydrogène produit en moins de 10 minutes
- 3m³ of hydrogen produced within 10 minutes

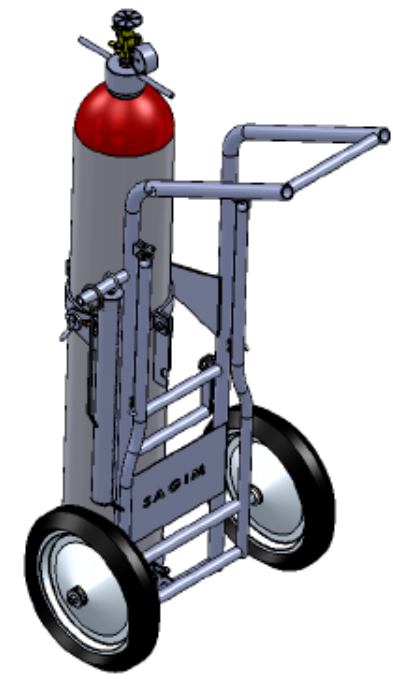
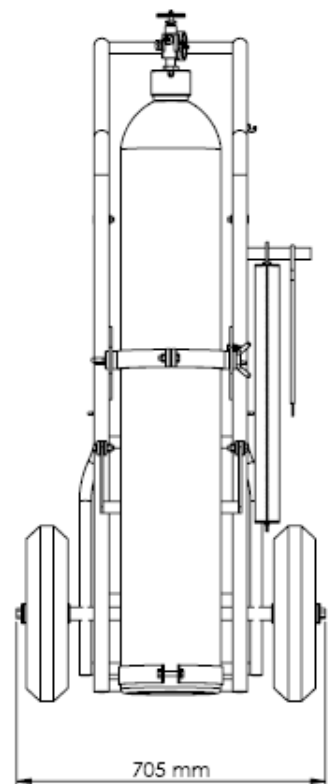
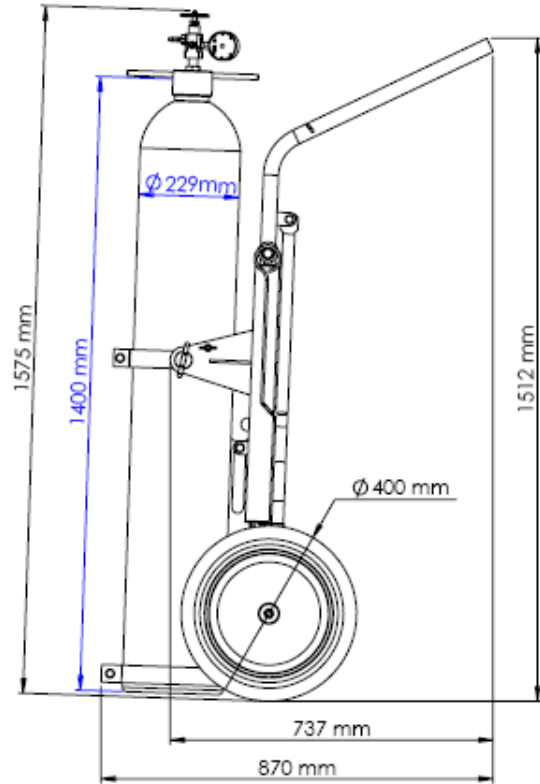
VIDANGE
DRAINING




RINCAGE
RINSING



GIP 3 LAYOUT (SERIAL 6000) SCHEMA D'ENCOMBREMENT (SERIE 6000)



**Weight : 85Kg
Poids: 85Kg**

19/03/09	C.CHILLET			
Rep	Date	Name	Verif	Modification
		DIVISION	35,rue Scheurer Kestner 42000 ST-ETIENNE - FRANCE Tél : 04 77 92 20 00 Fax : 04 77 74 71 09	
GIP 3		GIP	Client :	
Layout GIP 3		Format : A3		Ech : 1/10
Schema d'encombrement (New generation 2009)		Drawing n°: GIP 3 -IM-15000/1		
Rev	0			