Hydrogen Storage Containers on the Base of LaNi5-type Metal Hydrides

Company Overview

LabTech has been founded 1993 in Sofia, Bulgaria. Initially established as metal hydrides (MH) research center, now the Company is one of the biggest producers of hydrogen storages on the base of MH for stationary and mobile applications in Europe.

LabTech has good research traditions, production facilities and a list of available metal hydrides with different and well-defined thermodynamic and kinetics properties. Metal hydride alloys are manufactured by high frequency vacuum melting. Applying high-tech method for metal powder production our metal hydrides has excellent catalytic properties defining fast kinetics of charging presses.

Hydrogen Storage Technologies

Metal hydrides are very attractive for hydrogen storage in consideration of their inherent safety and good performance characteristics. Presently commercially available Rare earth metal hydrides have a hydrogen content of 1.4 wt % hydrogen which makes them more volume efficient than compressed gas or liquid hydrogen storage.

LabTech supply safe, compact and light HBond© - Hydrogen Storage Containers, holding reversible metal hydride alloys that absorb and desorb rapidly large amounts of hydrogen at low pressures and in the temperature ranges from -20° to +200°C. Development of a new hydride alloy according customer requirements is a regular work in the LabTech research center.

LabTech supply standard and custom hydrogen storage containers with different sizes and thermodynamics working conditions that store from 5 to 10 000 N liters of hydrogen. Hydrogen storage units could be equipped with internal water-cooling system allowing vessel to be full charged and discharged in 10-15 minutes.

HBond© hydrogen storage containers release hydrogen with very high purity - more than 99.9999% hydrogen at the outlet of a metal hydride vessel. This property makes them the most suitable hydrogen source for gas chromatographs and other applications.
Hbond-1500

Metal Hydride Hydrogen Storage System

This system is able to store hydrogen inside of the metallic structure of the hydride: it's a more compact and safe solution in comparison with the traditional high pressure bottles.

TECHNICAL SPECIFICATIONS

Hydrogen Capacity: 1500 N liters Hydrogen
Diameter: 145 mm
Length: 350 mm
Weight: 14 kg (9 kg Metal Hydride)
Material: EN-AA 6063 Al alloy
Safety valve: 18 Bar
Heat Exchanger (internal): Cu

<table>
<thead>
<tr>
<th></th>
<th>HBond-1500 L</th>
<th>H Bond-1500 H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging Pressure</td>
<td>15 Bar</td>
<td>5 Bar (a)</td>
</tr>
<tr>
<td>Charging temperature</td>
<td>Max. 25°C</td>
<td>Max. 25°C</td>
</tr>
<tr>
<td>Charging Time</td>
<td>45-60 minutes</td>
<td>45-60 minutes</td>
</tr>
<tr>
<td>Discharging Pressure</td>
<td>10 to 2 Bar</td>
<td>5 to 2 Bar</td>
</tr>
<tr>
<td>Discharging Temperature</td>
<td>10 – 30°C</td>
<td>65 – 75°C</td>
</tr>
</tbody>
</table>
Metal Hydride Hydrogen Storage System

This systems are able to store hydrogen inside of the metallic structure of the hydride: it’s a more compact and safe solution in comparison with the traditional high pressure bottles. On the base of this unit HB-5000 could be produced Hydrogen Storage systems up to 100 Nm$^3$ hydrogen.

<table>
<thead>
<tr>
<th></th>
<th>HBond-5000 L</th>
<th>HBond-5000 H</th>
<th>HBond-7000 L</th>
<th>HBond-7000 H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen Capacity</td>
<td>5000 Nl H2</td>
<td>5000 Nl H2</td>
<td>7000 Nl H2</td>
<td>7000 Nl H2</td>
</tr>
<tr>
<td>Diameter:</td>
<td>169 mm</td>
<td>169 mm</td>
<td>169 mm</td>
<td>169 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>76 kg (34 kg MH)</td>
<td>76 kg (34 kg MH)</td>
<td>98 kg (46 kg MH)</td>
<td>98 kg (46 kg MH)</td>
</tr>
<tr>
<td>Length</td>
<td>1100 mm</td>
<td>1100 mm</td>
<td>1650 mm</td>
<td>1650 mm</td>
</tr>
<tr>
<td>Charging Pressure</td>
<td>15 Bar</td>
<td>5 Bar</td>
<td>15 Bar</td>
<td>5 Bar</td>
</tr>
<tr>
<td>Charging temperature</td>
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<td>Max. 25$^\circ$ C</td>
</tr>
<tr>
<td>Charging Time</td>
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<td>45-60 minutes</td>
</tr>
<tr>
<td>Discharging Pressure</td>
<td>10 to 2 Bar</td>
<td>5 to 2 Bar</td>
<td>10 to 2 Bar</td>
<td>5 to 2 Bar</td>
</tr>
<tr>
<td>Discharging Temperature</td>
<td>10 – 30$^\circ$ C</td>
<td>65 – 75$^\circ$ C</td>
<td>10 – 30$^\circ$ C</td>
<td>65 – 75$^\circ$ C</td>
</tr>
</tbody>
</table>
HBond-10 000 NI H₂
(2 x 5000 NI H₂)
Capacity: 10 000 Nlites H₂
Length: 1100 mm
Height: 800 mm
Width: 220 mm

FIRST INSTALLATION:
http: www.inasmet.es
e-mail: jantonan@inasmet.es

HBond-20 000 NI H₂
(3 x 7000 NI H₂)
Capacity: 20 000 Nlites H₂
Length: 1 500 mm
Height: 800 mm
Width: 600 mm

FIRST INSTALLATION:
http: www.helion-fuelcells.com
e-mail: francis.granzotto@helion-fuelcells.com

HBond-45 000 NI H₂
(6 x 7500 NI H₂)
Capacity: 45 000 Nlites H₂
Length: 1 500 mm
Height: 800 mm
Width: 2x 600 mm

FIRST INSTALLATION:
http: www.cres.gr
e-mail: nlymber@cres.gr
Metal hydrides are formed when hydrogen gas react with Rare-earth alloys. This reaction is exothermal. Therefore, the hydrogen storage must be cooled during charging and heated during discharging in order to compensate the enthalpy of hydride formation.

Depending on the alloy chemical composition, this reaction takes place at different hydrogen pressures and temperatures. The relationship between hydrogen pressure, temperature, and rates of charging and discharging is important in using metal hydrides for hydrogen storage. In order to insure the conditioning of the Hydrogen Storage and to have good integration with Fuel Cell LabTech supply Hydrogen and Water Control Units.
Hydrogen can be directly converted to thermal energy by hydrogen burners. Hydrogen burners with a thermal power output from 500 to 5000 kW have been developed by the Labtech Ltd.

Hydrogen burners have been used to construct stationary and non-stationary hydrogen cookers (0.5 to 5 kW). The main advantages of hydrogen cookers are:

- Simple, safety and sturdy construction
- Free COx and Low NOx emissions
- User friendly operation

Because of clear advantages over other hydrogen storage techniques, hydrogen cookers are equipped with hydrogen storages on the base of Metal Hydrides.

The Hydrogen cooker is very attractive for kitchens in green houses and boats.

It is a important solution for these areas which have no grid and no effective energy carrier. With this reason Labtech cooking equipment meets the UNIDO requirement for the development of a H₂ cooker with portable hydride storage.
A full independent hydrogen energy power system for weekend house

The presented renewable hydrogen system consists of 9 units:

1. 1.25 kW PV Solar Panel;
2. 200 l/h DC- electrolyser;
3. 10 Nm³ Hydrogen Storage tank on the base of metal hydrides;
4. 2 x 1000W Hydrogen Cooker;
5. 500 – 1000 W Fuel Cell;
6. Converter - 48 V DC - 220 VAC ;
7. Water solar boiler- 150l;
8. Hydrogen and water control system;
9. Field Point NI industrial controller;

During the days electricity from PV is collected and stored as hydrogen. The kitchen is equipped with Hydrogen Cooker. The Fuel Cell burns hydrogen from the storage tank producing electricity. A Hydrogen Storage tank is able to supply the Hydrogen Cooker and Fuel Cell with hydrogen for production of minimum 10 kWh electricity and/or 20 kWh thermal power in total. All components are integrated by Field Point NI industrial controller.

In order to control and to cover optimal exploitation characteristics of the complete energy system, the data of the pressure and flow changes during the operation are measured, controlled and stored by the Data Adjusting System on the base of NI FieldPoint intelligent controller running LabVIEW Real-Time software.

The H₂ control unit with Field Point NI industrial controller (at the bottom)   Fuel cell with Hydrogen Storage (at the bottom)
**PC-based automatization system with build in SIEMENS LOGO Modules**

**Labtech DataGather** is designed for measurement, processes control and data logging for applications that involve diverse sensors and actuators. The collected data are saved on own PC and could be transferred in real time over large distances by Ethernet/Internet. WEB and FTP server are running under Linux operating system.

**Labtech DataGather** is one powerful integrated device for industry and research. It consists of two components:
- SIEMENS LOGO! measuring and control modules and
- PC - Linux powered able to collect and transfer real time data via TCP/IP
### Siemens LOGO! Technical Specification

<table>
<thead>
<tr>
<th></th>
<th>Base module (BM)</th>
<th>Analog modules (AM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOGO! 12/24</td>
<td>2 x LOGO! AM2</td>
</tr>
<tr>
<td>Inputs</td>
<td>8</td>
<td>2 x 2</td>
</tr>
<tr>
<td>Analog inputs</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Input Range</td>
<td>0 to 10 V</td>
<td>0 to 10 V and/or 0/4 to 20 mA</td>
</tr>
<tr>
<td>Resolution</td>
<td>10 bits scaled to 0 to 1000</td>
<td>10 bits from 0 to 1000</td>
</tr>
<tr>
<td>Measuring range</td>
<td>10.8 V DC to 28.8 V DC</td>
<td>—</td>
</tr>
<tr>
<td>Input Current</td>
<td>1.5 mA for {3 to 8}, 0.1 mA for {1, 12, 17, 18}</td>
<td>—</td>
</tr>
<tr>
<td>Outputs</td>
<td>4 relays</td>
<td>—</td>
</tr>
<tr>
<td>Continuous current</td>
<td>10 A for resistive load, 3 A for inductive load</td>
<td>—</td>
</tr>
<tr>
<td>Cable length</td>
<td>—</td>
<td>10 m</td>
</tr>
<tr>
<td>Sensor supply</td>
<td>—</td>
<td>None</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>DC 12/24 V</td>
<td>12 / 24 V DC</td>
</tr>
<tr>
<td>Permissible range</td>
<td>10.8 to 28.8 V DC</td>
<td>10.8 to 28.8 V DC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>0.7 to 2.1 W (12 V)</td>
<td>0.3 to 0.8 W</td>
</tr>
<tr>
<td>Dimensions</td>
<td>72 (4 W) x 90 x 55 mm</td>
<td>36 (2 W) x 90 x 53 mm</td>
</tr>
</tbody>
</table>

### Alix1d Industrial PC

**Spec:**
- **CPU:** 500 MHz AMD Geode LX
- **DRAM:** 256 MB SDRAM, 4 GB Card
- **Storage:** CompactFlash socket, 44 pin IDE
- **Power:** 12V DC, DC-DC converter on board
- **Expansion:** miniPCI + 3.3V PCI + LPC
- **Connectivity:** 1 Ethernet channel (10/100)
- **I/O:** 2 COM, 4 USB, 1 LPT, audio, VGA
- **Board size:** 6.7 x 6.7" (miniITX), low profile
- **Firmware:** Award BIOS

**Manufacturer:** PC Engines CH

**Documentation:**
- [Brochure](#)

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**Labtech DataGather** is also used for components integration (PV, Electrolyser, Hydrogen Storage and Fuel Cell) of hydrogen renewable systems.
In a reference list bellow are some of Labtech customers:

**CESI (ENEL), IT -1995 - 2000**
2 x 6 Nm³ Hydrogen Storages, metal hydrides

**“FIRST”- EU Project, (CSIC), ES - 2001**
80 Nm³ Hydrogen Storage

**NorskHydro Electrolysers, NO - 2001**
5 Nm³ Hydrogen Storage, Metal Hydrides

**Inst. for Energy Technology (IFE), NO - 2002**
Metal Hydrides for Hydrogen Storages

**Intelligent Energy Ltd, UK - 2002**
5 Nm³ Hydrogen Storage

**Hexion b.v., NL - 2002**
Metal Hydrides for Hydrogen Purification Unit

**TREIBACHER AUERMET Produktionsges.mbH, AT - 2002**
5 Nm³ Hydrogen Storage

**“HELPS”- EU Project - 2003, HELION, FR**
25 Nm³ Hydrogen Storage

**SOL group, IT - 2003,**
Metal Hydrides for Hydrogen Purification Unit

**INETI, Departamentode Materiais, PT - 2003**
10 Nm³ Hydrogen Storage

**ENEA, IT - 2003,**
7 Nm³ Hydrogen Storage

**Ferrara University, IT - 2004**
5 Nm³ Hydrogen Storage

**Roma University, IT - 2004**
1.5 Nm³ Hydrogen Storage

**Giacomini group - 2005, IT**
5 Nm³ Hydrogen Storage

**“RES2H2”- EU Project, CRES, GR - 2005**
45 Nm³ Hydrogen Storage

**Frederick Institute of Technology, Nicosia, CY - 2005**
2 x 5 Nm³ Hydrogen Storages

**Tropical Spa, Athens, GR – 2005**
50 x 20l hydrogen storages

**KIMEKS A.S., Istanbul, Tr – 2005**
3 x 500 Nliters hydrogen storages

**VSB - Technical University of Ostrava, CZ - 2006**
3 x 500 Nliters hydrogen storages

**HySyLAB, IT - 2006**
50 x 250l Hydrogen Storages for Olympic Games hydrogen scooters
Electro Power Systems Spa, Alpignano, IT – 2006
10 Nm³ Hydrogen Storage

CNR-INFM, Università di Roma "La Sapienza", IT – 2007
1.5 Nm³ Hydrogen Storage

La Fabbrica del Sole Spa, Arezzo, IT - 2007
1.5 Nm³ Hydrogen Storage

Istituto Tecnologie Avanzate, (ITA), Trapani, IT - 2007
2 x 1.5 Nm³ Hydrogen Storages

“ITHER” Project, Tecnologías del Hidrógeno en Aragón , SP - 2007
20 Nm³ Hydrogen Storage

“HIDROTEC” Project, INASMET, San Sebastiaoan, SP - 2007
10 Nm³ Hydrogen Storage

SENER Spa., Madrid, SP - 2007
5 Nm³ Hydrogen Storage

Sevilla University, SP - 2007
7 Nm³ Hydrogen Storage

AUTOSIL Spa, Paco de Arcos, PT - 2007
3 x 1.0 Nm³ Hydrogen Storages

SRE Spa, Ramalhal, PT - 2007
10 x 100 Nliters Hydrogen Storages

Cardec International GmbH, Frankfurt, GE – 2007
500 Nliters Hydrogen Storage

UNIDO-ICHET, Istanbul, TR - 2007
750 Nliters Hydrogen Storage

CIDETEC, San Sebastiaoan, SP - 2008
1.5 Nm³ Hydrogen Storage

NITIDOR - ENEL, Milano, IT - 2008
2 x 1.5 Nm³ Hydrogen Storages

CRES, Athina, GR - 2008
Hydrogen Cooker with 1500l Hydrogen Storage

INEGI, Porto, PT - 2008
10 * 50l hydrogen storages

LNEG, Lisbon, PT - 2008
Hydrogen weekend bungalow – Complete system with 10 Nm³ Hydrogen Storage

Universidad Extremadura Badajoz – SP - 2008
1.5 Nm³ Hydrogen Storage

INGEMA S.l., Cáceres, SP – 2008
5 Nm³ Hydrogen Storages

University of Padova, IT - 2008
2 x 750 Nliters Hydrogen Storages
UNIDO-ICHET, Istanbul, TR - 2008
Hydrogen Cooker with 1500l Hydrogen Storage

Universidade de Aveiro, PT - 2008
Standards of metal hydrides

Acta Spa, Pisa, IT – 2009
2 x 150 Nlitters Hydrogen Storages

ENEL - “Diamond” project, IT - 2009
20 Nm³ Hydrogen Storage

Prototech AS – “H₂ - Ferry” project, NO - 2009
30 Nm³ Hydrogen Storage

LNEG, Lisbon, PT - 2009
1.5 Nm³ Hydrogen Storage

Universidad Extremadura Badajoz – SP - 2009
5 Nm³ Hydrogen Storage

Centro Nacional en Tecnologías del Hidrógeno, Puertollano, SP - 2010
2 x 1.5 Nm³ Hydrogen Storage

H₂NITIDOR Srl, Casalpusterlengo, IT – 2010
1.5 Nm³ Hydrogen Storage

HYDROCELL OY, Jarvenpaa, FI – 2010
Metal hydrides for Alkaline Fuel Cell

UNIDO-ICHET, Istanbul, TR - 2010
Hydrogen Cooker with 5000 l Hydrogen Storage

Thermax Limited, PUNE, India - 2011
100 kg. Metal Hydrides for Hydrogen Air Conditioner

Inst. for Energy Technology (IFE), NO - 2011
180 kg. Metal Hydrides for Hydrogen Compressor

SGS hydrogen Bergamo, IT - 2011
30 Nm³ Hydrogen Storage (with H₂ - control unit) for boat applications

Indian Institute of Technology Guwahati, India - 2011
100 kg. Metal Hydrides for Hydrogen Air Conditioner

PaxiTech SAS, Echirolles, FR - 2011
4 x 500 l Hydrogen Storage

INETI, Lisbon, PT - 2011
10 Nm³ Hydrogen Generator&Storage on the base of NaBH₄ - Sodium borohydride

ÁTOMOLIDER Logística de Hidrogénio Lda, Torres Vedras, PT - 2011
2 x 1.5 Nm³ Hydrogen Storages

Institute of Solid State Physics, Riga, Latvia – 2012
7 Nm³ + 1.5 Nm³ Hydrogen Storage (with H₂ and water - control units)
Hydrogen cooker

University of Seville, SP – 2012
7 Nm³ Hydrogen Storage
Hydrogen Foundation of Aragon, Huesca, SP – 2012
Hydrogen Storage/Compressor on the base of La$_{0.7}$Ce$_{0.3}$Ni$_5$ metal hydride

Elfon Ltd, Athens, GR – 2012
8 x 250 Nliters Hydrogen Storages

Genport S.r.l., Vimercate, IT – 2012
2 x 1.5 Nm$^3$ Hydrogen Storages

ALBHYOSN. A.S., ALBI, FR – 2012
500 Nliters Hydrogen Storage

Oztiryakler A.S., Istanbul, TR – 2012
Hydrogen Cooker

HSH Group s.r.o., Kosice, SL – 2012
27 Nm$^3$ Hydrogen Storage

Pragma Industries SAS, BIDART, FR - 2012
3.5 Nm$^3$ Hydrogen Storage

El.Ma. Electronic Machining s.r.l, Riva del Garda, IT - 2012
250 Nliters Hydrogen Storage

CIEMAT, Madrid, SP – 2012
5 x 100 Nliters Hydrogen Storages

ARIEMA Energia y Medioambiente S.L., Madrid, SP – 2012
1.5 Nm$^3$ Hydrogen Storage

Fundacao da Faculdade de Ciencias e Tecnologia, Caparica, PT- 2013
2 x 10 Nliters Hydrogen Storages

Ad-Venta, Bourg de Péage, FR - 2013
30 Nliters Hydrogen Storage

University of Miami, Fl, USA – 2013
3 x 10 Nliters Hydrogen Storages

Universidade Federal de Santa Maria, Rs, Brazil – 2013
7 Nm3 Hydrogen Storage

TUBE&YOU s.r.l., Pordenone, IT – 2013
2 x 40 Nliters Hydrogen Storages

Chris Walker, Berkeley, Ca. USA - 2014
350 Nliters Hydrogen Storage

Universidad de Santiago de Chile, Santiago, Chile - 2014
5 Nm3 Hydrogen Storage + 1.5 Nm3 Hydrogen Storage

Pragma Industries SAS, BIDART, FR – 2014
500 Nliters Hydrogen Storage + 20 Nliters Hydrogen Storage
Ltd, Athens, GR – 2014
2 x 3 Nm3 Hydrogen Storage

Istituto di Tecnologie Avanzate per l’Energia “Nicola Giordano”, Messina – ITALY - 2014
1.5 Nm3 Hydrogen Storage

CSIRO Energy Technology, Victoria, AUSTRALIA – 2014
2 x 5 Nm3 Hydrogen Storage

Pragma Industries SAS, BIDART, FR – 2014
100 Nliters Hydrogen Storage + 250 Nliters Hydrogen Storage + 1000 Nliters Hydrogen Storage

Aquachim JSC, University of Chemical Technology and Metallurgy, Sofia, BG – 2015
6 x 5 Nm3 Hydrogen Storage

WH2, Lyon, FRANCE – 2014
1.5 Nm3 Hydrogen Storage + Hydrogen Cooker

ARIEMA ENERXIA S.L., Santiago de Compostela (SPAIN) – 2014
3 x 1.5 Nm3 Hydrogen Storage + 3 x 5 Nm3 Hydrogen Storage

Universita degli Studi di Genova, Genova, Italy – 2014
500 Nliters Hydrogen Storage

Pragma Industries SAS, BIDART, FR – 2014
5 Nm3 Hydrogen Storage

Pragma Industries SAS, BIARRITZ, FR – 2015
2 x 10 Nm3 Hydrogen Storage

CTS Energy s.r.l., Viscone, IT – 2015
2 x 300 Nliters Hydrogen storage

Pragma Industries SAS, BIARRITZ, FR – 2015
250 Nliters Hydrogen Storage + 2 x 500 Nliters Hydrogen storage

ARIEMA ENERXIA S.L., Santiago de Compostela, SP – 2015
6 x 500 Nliters Hydrogen storage

Universita degli Studi di Genova, Genova, IT – 2015
500 Nliters Hydrogen storage

Pragma Industries SAS, BIARRITZ, FR – 2015
2 x 1.5 Nm3 Hydrogen storage

Aquachim JSC, University of Chemical Technology and Metallurgy, Sofia, BG – 2015
7 x 5 Nm3 Hydrogen Storage

HSH Group s.r.o. Kosice, Slovakia, – 2015
3 x 500 Nliters Hydrogen storage

Universidad de Santiago de Chile, – 2015
Kit of part and pieces to assemble the Hydrogen and Water control unit
Xergy, Inc., USA – 2016
metal hydride alloy – 11kg

Pragma Industries SAS, BIARRITZ, FR – 2016
2x100 Nliters Hydrogen Storage + 3 x 30 Nliters Hydrogen storage

Xergy, Inc., USA – 2016
27 x 50 Nliters Hydrogen storage + 2 x 1.5 Nm3 Hydrogen Storage

Charge2C-NewCap Lda, Benavente, Portugal PT -2016
1kg Metal Hydride

Genport S.r.l., Vimercate, IT – 2016
2 x 3 Nm3 Hydrogen Storage with electrical heaters

H2Boat societa cooperativa, Genova, IT - 2016
3 x 500 Nliters Hydrogen Storage

"AT Energy ", LLC, Moscow, Russia - 2016
2 x 10 Nliters Hydrogen storage + 2 x 30 Nliters Hydrogen storage + 2 x 50 Nliters Hydrogen storage

Pragma Industries SAS, BIARRITZ, FR – 2016
2 x 500 Nliters Hydrogen Storage + 10 x 30 Nliters Hydrogen storage

HSH Group s.r.o., Kosice, SL - 2016
3 x 550 Nliters Hydrogen storage + 1 kg metal hydride alloy

Clean H, Amsterdam, NL – 2016
32 x 50 Nliters Hydrogen Storage

The Henryk Niewodnicza, Polish Academy of Sciences, Cracow, PL – 2016
50 Nliters Hydrogen Storage

Pragma Industries SAS, BIARRITZ, FR – 2016
7 Nm3 Hydrogen Storage

ARIEMA ENERXIA S.L., Santiago de Compostela, SP – 2017
6 x 4 Nm3 Hydrogen Storage

Pragma Industries SAS, BIARRITZ, FR – 2017
3 x 1.5 Nm3 Hydrogen Storage + 350 Nliters Hydrogen Storage

AMIRHHO SRL, Targu Neamt, RO - 2017
300 Nliters Hydrogen Storage + 600 Nliters Hydrogen Storage

Clean H, Amsterdam, NL – 2017
32 x 50 Nliters Hydrogen Storage

Pragma Industries SAS, BIARRITZ, FR – 2017
10 x 50 Nliters Hydrogen Storage + 10 x 30 Nliters Hydrogen storage

Senseris B.V., Mijdrecht, NL – 2017
250 Nliters Hydrogen Storage