

# HYSCAN II HYDROGEN IN ALUMINIUM ANALYSER

**MECHATECH**  
SYSTEMS

TECHNICAL VACUUM EXCELLENCE SINCE 2008

PROVEN TECHNOLOGY - ANALYSIS WITHIN 5 MINUTES

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The [Hyscan II Hydrogen in Aluminium Analyser](#) is used on the shop floors of production foundries throughout the world, providing the quantitative measurement of hydrogen in the melt within 5 minutes of sampling.

Substantial improvements in the quality and reliability of aluminium alloy castings can be achieved if the hydrogen content of the melt is controlled. Aluminium alloys absorb hydrogen in the liquid state and unless it is removed, porosity will occur in the casting. Accordingly, an accurate measurement of hydrogen in the melt before casting is essential to ensure that degassing operations achieve the specified quality acceptance value.



Hyscan II, used in production foundries worldwide, provides analysis within 5 minutes of sampling

This measurement is provided on the foundry shop floor by the HYSCAN II Hydrogen in Aluminium Analyser. The instrument is robust, mobile and easy to use, and provides the operator with a quantitative measurement of hydrogen in the melt within five minutes of sampling.

Aside from its use as a quality control tool, the instrument can be also be used for process investigation and for the evaluation of melt treatments. Financial benefits also accrue from lower scrap rates and reduced energy and labour costs. These savings often allow the retrieval of the capital cost of the instrument in less than one year.

## FEATURES:

- Monitors hydrogen during aluminium alloy processing operations by a quantitative reduced pressure technique
- Used for quality control and process investigation
- Simple to operate; reliable, mobile, robust
- Rugged design for use on shop floor
- Ideal for assessing degassing agents, melt treatments and identifying the sources of gas pick-up or loss
- Analysis completed within five minutes of sampling
- Data provided allows corrective action to be taken before casting
- UK designed, manufactured and fully supported

## GLOBAL USAGE:

HYSCAN II is a proven technology which is used by Production Foundries in the following countries:

Australia, Brazil, Bulgaria, Canada, China, Eire, Finland, France, Germany, Greece, Holland, Hungary, India, Indonesia, Italy, Japan, Korea, New Zealand, Norway, Oman, Romania, Singapore, South Africa, Sweden, Thailand, Turkey, United Kingdom, United States, Venezuela



Hyscan II is UK designed, manufactured and supported

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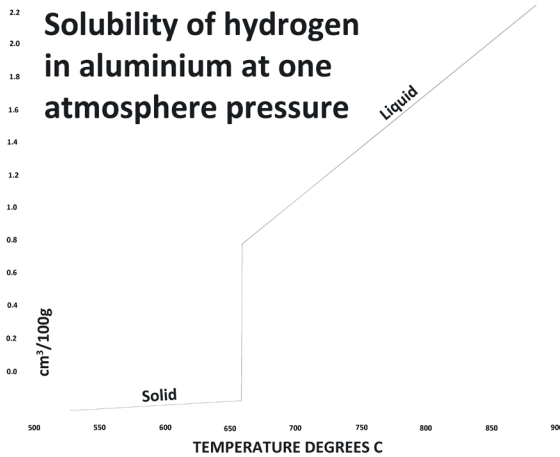
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## OCCURENCE OF HYDROGEN IN ALUMINIUM AND ITS ALLOYS:



Hydrogen in molten aluminium and its alloys derive primarily from the aluminium – water reaction:



A major source of water vapour is the atmosphere but other contributors include products of combustion (when melting is undertaken in gas or oil fired furnaces), the use of hygroscopic degassing or fluxing materials, the presence of reactive materials in the melt and hydrated corrosion products on feed material.

The hydrogen formed is absorbed by the liquid aluminium and unless most of it is removed by degassing techniques, porosity will be observed in the casting.

## HYSCAN II - METHOD:

The instrument uses a reduced pressure technique to determine the hydrogen content.

A sample of the molten alloy (100g) is poured into a small, stainless steel chamber and the pressure reduced within several seconds to  $10^{-1}$  mbar by a vacuum pump. The chamber and associated vacuum system is then isolated from the pump and the sample allowed to solidify.

The operating pressure is 2-3 orders of magnitude lower than the traditional and qualitative reduced pressure tests and this ensures that during the controlled solidification of the sample, all of the hydrogen is released. As hydrogen is released during cooling, its partial pressure is measured by a calibrated Pirani gauge from which the hydrogen content in the sample is calculated.

The results obtained are displayed in terms of  $\text{cm}^3/100\text{g}$  and can be printed or transmitted to an external data logging system. Calibration is achieved by simply introducing known volumes of hydrogen into the system and making appropriate adjustments to the Pirani gauge. The sensitivity of the measurement is  $0.01\text{cm}^3/100\text{g}$  and when the results obtained using the instrument are compared with those using the classical vacuum subfusion test, a difference in readings of less than 5% is observed for standard aluminium – silicon casting alloys.

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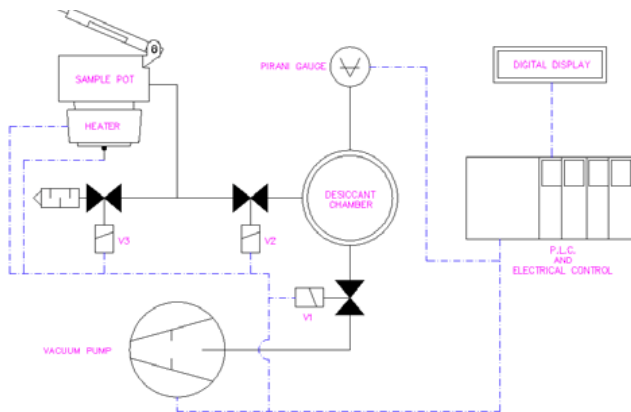
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## HYSCAN II - DESCRIPTION:

The layout of the vacuum system is shown in the schematic:



It comprises a vacuum pump, desiccant chamber (to remove any residual moisture), solenoid valves, sample chamber and Pirani gauge.

The vacuum system is mounted in a rigid steel framework supported on four heavy-duty castors. The sample chamber is sealed by a lid and viton O ring, and is situated adjacent to the control panel. It is heated to prevent quench cooling of the sample.

The control panel has three switches, which operate the power, test and measure functions and a digital display showing the hydrogen content in cm<sup>3</sup>/100g.

Behind the control panel are mounted the power supply and electronic logic boards; when an optional printer or data logging output is required, these are also installed behind the control panel with outputs at the rear of the instrument. Power is supplied to the instrument via five metres of armoured cable, which can be stored in the base of the framework when not in use.

## SPECIFICATION:

|                       |  |
|-----------------------|--|
| Overall dimensions:   | 600mm x 600mm x 1000mm high (approx.)  |
| Overall weight:       | Net: 155kg Gross: 160Kg  |
| Power requirement:    | 240V, 50Hz, 1ph, 100V, 50/60Hz option available                                |
| Supplied with:        | 5 metre armoured power cable   |
| Sample weight:        | 100g   |
| Measurement time:     | 5 minutes  |
| Range:                | Up to 1.00cm <sup>3</sup> /100g  |
| Sensitivity:          | 0.01cm <sup>3</sup> /100g  |
| Accuracy:             | Less than 5% difference between instrument method and vacuum sub-fusion method |
| Optional accessories: | Printer, data output via RS232 or centronics socket                            |
| Spares:               | Spares kits or individual spare parts available                                |

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