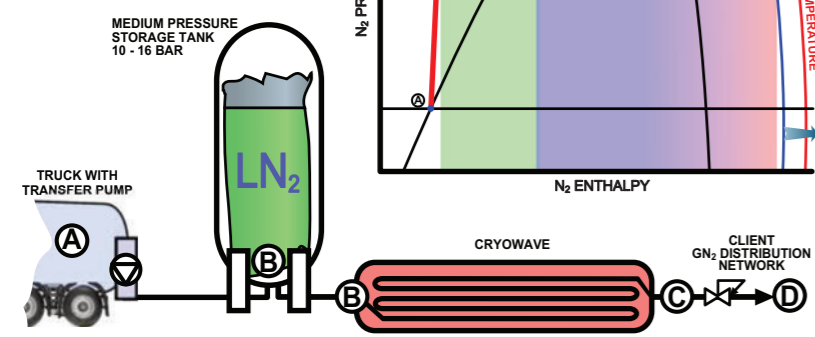


**CRYOWAVE** by RLD is a modular design using tubes optimized with tube inserts for an uniform and improved heat exchange over the total tube length. Moreover, RLD has identified the sub-cooled LN<sub>2</sub> from the storage tank as the origin of flow pulsations.

A two-stage design takes care of a make-up of low mass N<sub>2</sub> mists inside the vaporizer tubes.

Thanks to this solution fast response times of a few seconds have become possible for temperature, pressure and capacity variations.



New **applications** appear for vaporization, especially for nitrogen, with a need for strong instantaneous flow rates but over a short period.

For example:

- Satellite acoustic test chambers
- Pressurization of autoclaves for the polymerization of fabrics

The technical approach for designing the optimal vaporizer for above situations requires a review of the available energy sources and thermal processes at the customer site.

Possible free energy:

- ground water
- water ponds and rivers

This approach differs from fossil sources such as electrical heating and gas/fuel burners as traditionally used in glass, chemical and steel industries.



design: Norman Quast - © 2015



# CRYOWAVE

The new water bath vaporiser for cryogenic fluids

## Technical information

RLD vaporizers are mostly designed for liquefied air gases, CO<sub>2</sub>, ethylene and methane. They have no limit in gas generation capacity, thanks to the modular concept of the vaporizer tubes, combined into a single enclosure (see picture at right).

Different basic forms of water bath vaporizers are possible:

- horizontal tubing in open bath
- shell and tube configuration (vertical or horizontal)
- spiral tubing in vertical vessel minimizing the footprint

The installation is fully adapted to the circumstances and possibilities of the customer's site.

Example: A recently supplied GN<sub>2</sub> generator for acoustic testing of satellites has following characteristics:

- GN<sub>2</sub> flow rates: 0 to 9 kg/s (equivalent to 0-26000 Nm<sup>3</sup>/hour)
- GN<sub>2</sub> thermal stability: ± 0,5°C @ 20°C
- GN<sub>2</sub> pressure stability: ± 7 mbar @ 2-4 barg
- Response time: less than 10 seconds

For electrically heated vaporizers: see our **HEXAL** brochure.

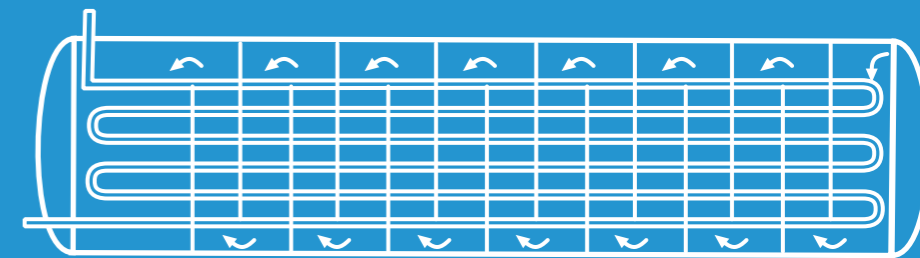
The green sign for Economical Solutions for equipment using LN<sub>2</sub> indicates products developed by RLD Thermique - Ingénierie from Grenoble France.

Grenoble is known worldwide for high technology and innovative solutions. In addition to the local high manufacturing quality of industrial and scientific products the company RLD Thermique - Ingénierie has made it their trademark to optimize their designs for low LN<sub>2</sub> consumption combining efficiency, reliability, low maintenance and longevity.

Over 40 years experience in designing and manufacturing key elements for major international projects guarantees high quality units optimized for their intended tasks.

For additional information see:

[www.thermique-ingenierie.fr](http://www.thermique-ingenierie.fr)



Water bath vaporizers, till now have mainly remained of empirical design, extrapolated from previous concepts. Since traditional boiler makers did not have the means to analyse thermal exchanges, they often still use duplication of existing units to satisfy the power requirements. These designs however, remain with overall poor energy balance.

**Thermique et Ingenierie RLD** has developed an extensively proven proprietary mathematical model based on hundreds of sold units and over 40 years of practical experience in the field. The resulting **CRYOWAVE** vaporizers permit the use of water from temperatures as low as 5-10°C (e.g.: freely available water from ponds, rivers, ground water, etc..)

**CRYOWAVE** water bath vaporisers for cryogenic fluids are characterised by:

- fully optimized heat exchange surfaces
- forced flow paths for improved fluid-to-surface contact in both heat exchanging volumes
- economical operation thanks to little or no use of fossil energy sources
- impressive overall thermal efficiency in compact dimensional design.
- exclusive two-stage make-up of sub-cooled cryogenic fluid for pulse-free continuous gas flow
- various geometrical configurations possible to suit site constraints
- remote control and monitoring possible for process integration

An investment in a **CRYOWAVE** water bath vaporiser designed for cryogenic fluids will result in long-time trouble-free and economical operation

