

CLAIMS

1. A method for the real-time calculation of a residual chemical energy E contained in a pressurised tank (1) defined by its shape and its dimensions and containing a layer of liquefied natural gas (LNG), said layer of LNG being defined at a given instant t , by its temperature T , its density ρ , and its level h in said tank;

said method consisting of an algorithm that comprises, at the given instant t , the following steps:

A. Acquisition of characteristic parameters of the layer of LNG by measurement:

- of the level h of the layer of LNG in the tank, using a level sensor (2);

- of the temperature T using a temperature sensor (3); and

- of the density ρ using a density sensor (4); and

B. Determination of a total mass m_t of the LNG contained in the tank (1);

said method being characterised in that said algorithm further comprises, for each instant t , the following steps:

C. Calculation of a mass gross calorific value GCV_{mass} of the LNG using a function f taking as parameters the temperature and the density of the liquid according to the formula:

$$GCV_{\text{mass}} = f(T, \rho)$$

D. Calculation of the residual chemical energy E according to the formula:

$$E = GCV_{\text{mass}} * m_t$$

wherein the function f that connects the mass gross calorific value GCV_{mass} to the parameters T and ρ is of the form:

$$f(T, \rho) = A(T) + B * \rho$$

where:

- A is a constant value for a given temperature
- B is a constant independent of the composition.

2. The method according to claim 1, wherein:

- either said algorithm is reiterated as requested by an operator (7) using said tank (1);
- or said algorithm is carried out automatically, as soon as a given interval of time Δt has elapsed.

3. The method according to claims 1 or 2, wherein the determination of the total mass m_t of LNG contained in the tank (1) is carried out via a direct measurement using a balance or strain gauges.

4. The method according to claims 1 or 2, wherein the determination of the total mass m_t of LNG contained in the tank (1) is carried out via a calculation according to the formula:

$$m_t = \rho * g(h)$$

where:

- h is the level of the layer of LNG in the tank,
- ρ is the density of the LNG, and
- g is a function linked to the shape of the tank.

5. A system for the real-time calculation, according to the method defined according to any of claims 1 to 4, the residual chemical energy E contained in a pressurised tank (1)

defined by its shape and its dimensions and containing a layer of liquefied natural gas (LNG), said layer of LNG being defined at a given instant t , by its temperature T , its density ρ , and its level h in said tank;

5 said system being characterised in that it comprises:

- a calculator (5) intended to be connected to level (2), temperature (3), and density (4) sensors of which said tank (1) is provided with, said calculator (5) being able to execute the algorithm of the method defined according to any of claims 1 to 5,
- an MMI interface (6), interacting with said calculator (5) in order to report to the operator, the amount of residual chemical energy obtained by the algorithm of the method defined according to any of claims 1 to 4,

15 wherein said system is an onboard system in which:

- the calculator (5) is an onboard calculator connected to said level (2), temperature (3), and density (4) sensors, said calculator (5) being specifically designed to execute the algorithm of the method according to any of claims 1 to 4,
- the MMI interface (6) is an onboard interface of the vehicle onboard dashboard type or an offset interface.

25 6. A vehicle comprising a pressurised tank (1) containing a layer of liquefied natural gas and being provided with level (2), temperature (3) and density (4) sensors, said vehicle being characterised in that it further comprises the system defined according to claim 5.