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## Economic Commission for Europe

### Inland Transport Committee

#### Working Party on the Transport of Perishable Foodstuffs

##### Sixty-seventh session

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Item 5 (b) of the provisional agenda

**Proposals of amendments to ATP: Pending proposals**

### **Measuring the effective refrigerating capacity of systems using liquefied gases<sup>1</sup>**

**Transmitted by the Government of France**

#### **I. Context**

1. The Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for such Carriage (ATP), signed in 1970, established from the outset:
  - A test for the efficiency of all cooling appliances, with specifications for refrigerated equipment using liquefied gases, and
  - A way of measuring the effective refrigerating capacity of a unit when the evaporator is free from frost.
2. In 2009, the official testing station in France, Cemafruid, proposed a procedure for measuring the effective refrigerating capacity of units using liquefied gases.
3. In 2010, the Netherlands asked the IIR CERTE Sub-Commission and WP.11 to clarify the situation of units using liquefied gases, in particular, in respect of the refrigerating capacity of such units.
4. In 2011, CERTE asked France to submit a proposed amendment to ATP addressing this question.

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<sup>1</sup> In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106; ECE/TRANS/2010/8, activity 02.11).

## Current situation

5. The test procedure for measuring the effective refrigerating capacity of cooling units set out in annex 1, appendix 2, Chapter 4, of ATP does not exclude any particular technology. Specifically, it does not exclude refrigeration units using liquefied gases. Nonetheless, the way the test procedure is described and the terminology used are those typically applied to fan-cooled refrigeration units using vapour-compression refrigeration.

6. Many units using liquefied gases were tested using this procedure between 2008 and 2011 at Cemafruid's Antony and Cestas sites. The tests showed that with some minor terminology changes, the procedure can be used as is.



A calorimeter testing a unit using liquefied gases.

## Constraints for systems using liquefied gases

7. Most units can be tested using this method. The main constraint lies in the difficulty of obtaining a homogeneous temperature, as required by the test method.

## Proposed capacity test protocol

8. It is proposed to use the test procedure set out in annex 1, appendix 2, Chapter 4, of ATP. The energy consumption will be measured in terms of the mass of liquefied gas used.

## Impact of the test

### Technical impact of the test method

9. Currently, the only test method available for these systems is the efficiency test method, which requires a number of tests for each possible configuration of a given unit.

10. The proposed method would significantly reduce the number of tests required for such units so that they are subject to a number of tests comparable to those for vapour-compression units and fan-cooled units.

11. Unit dimensions will be taken into consideration as well; they will figure in the effective refrigerating capacity and heat transfer formula.

### **Economic impact of the procedure**

12. The reduction in the number of tests reduces the total cost of the unit, despite the refrigeration capacity tests being slightly more complex and expensive than the efficiency tests.

### **Conclusion**

13. The choice of a more appropriate test will make it possible to offer a better comparison of the available technologies.

### **Proposed amendment**

Annex 1, appendix 2

4. [...]

4.1 General principles

4.1.1

[...] temperature difference in equilibrium.

**This method is also applicable to units or systems using liquefied gases for direct or indirect cooling. In such cases:**

- **The sublimation system shall if necessary be assimilated to the evaporator in the test method in 4.2, and the temperatures shall not be measured at the system inlet (4.2.2 (a)),**
  - **The energy consumption (4.2.2 (b)) shall be measured in terms of the mass of liquefied gas.**
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