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Status and implementation of the Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for such Carriage (ATP): Exchange of good practices for better implementation of ATP

Procedure for measuring the capacity of single-emitter, dual-temperature refrigerated and mechanically refrigerated units

Transmitted by the Government of France

Summary

Executive summary:	ATP does not establish a methodology for testing single-emitter, dual-temperature units. Furthermore, the dimensioning of this equipment must be added because the standard methodology from 1998 and that prescribed by ATP do not take into account the particular characteristics of these units.
Action to be taken:	The test methodology for single-emitter, dual-temperature units must take into account the different types of refrigeration units while adapting ATP requirements to the constraints imposed by the technology.
Related documents:	None.

Introduction

1. The market has seen the arrival of dual-temperature units, that is, units that do not permit the full reversibility of temperatures in the two separate temperature-controlled compartments within the transport equipment. Most dual-temperature units are equipped with two exchangers connected to a host unit or a source of cold. In some cases, the unit consists of a main exchanger connected only to the exterior of the insulated unit and a secondary exchanger that regulates the heat exchange between the two temperature-controlled compartments. It should be noted that the compartments must be sealed off from each other, that is, the exchange of material from one to the other must not be possible. For the purposes

of simplification, we shall refer to such a solution as a “single-emitter, dual-temperature unit”.

2. ATP does not offer a methodology for testing single-emitter, dual-temperature units. Furthermore, the dimensioning of these units by the competent authorities must be added, because the standard methodology from 1998 and that prescribed by ATP do not take into account the specific characteristics of these units.

3. Two types of unit, refrigerated and mechanically refrigerated, are affected.

4. Unlike mechanically refrigerated units, some refrigerated units comprise natural convection exchangers. The performance of these exchangers is influenced significantly by their environment (for example their positioning within the body and the body’s geometry).

5. The methodology for testing multi-temperature units requires each exchanger to be placed on a separate calorimeter whose thermal insulation must not exceed a certain threshold. However, in the case of single-emitter, dual-temperature units, the principle is based on a controlled reduction in the thermal insulation between the two temperature-controlled compartments. The particular nature of this test does not, therefore, comply with the requirements of ATP dated 6 January 2018.

6. Refrigerated units’ capacities increase in proportion to their reserve of cold. This variation does not allow for stable refrigerating capacity throughout an ATP test.

I. Proposal

7. Principles of the methodology for testing single-emitter, dual-temperature units.

8. In general, and for the purposes of testing, a distinction is made between the types of refrigeration units:

- Either the test laboratory verifies the refrigerating capacity provided by the exchangers or it determines it.

9. In the case of refrigerated equipment, the temperatures summarized in the table below must not be exceeded.

10. In the case of mechanically refrigerated equipment, temperatures must be maintained within ± 1 °C of the target temperature.

11. The tests to be carried out are detailed in the following table:

Test number	Exchanger no. 1	Exchanger no. 2	Refrigerated equipment		Mechanically refrigerated equipment	
	Target temperature [°C]		Q0 [W]	Compartment coupling	Q0 [W]	Compartment coupling
1	0	12(*)	Declared	Separate	Max.	Separate
2	-20	12(*)	Declared	Separate	Max.	Separate
3	-20	0	Declared	Separate or twinned	Declared	Separate or twinned

(*) Laboratory equipment must allow this temperature to be reached by means of input heat only, including that of the walls of the calorimeter. No additional cooling of the tested unit is permitted.

12. **The test must demonstrate that a refrigerated unit maintains the target temperature for at least 12 hours, and for at least 4 hours in the case of mechanically refrigerated units.**

Caution:

- Risk of freezing of the transported products (health risk);
- The volume of the body may affect refrigeration capacity where there is passive ventilation (health risk to be incorporated into the dimensioning of the units).

13. Principle of the dimensioning of equipment with a single-transmitter, dual-temperature mechanically refrigerated unit.

14. The amendment aims to convert the measured capacities of single-emitter, dual-temperature units to the measurements currently required by the methodology set out in section 7 of ATP for multi-temperature units by means of an amendment to paragraph 7.3.5:

$P_{eff\text{-}frozen\text{-}evap} = P_{ind\text{-}frozen\text{-}evap}$

15. This amendment results in the following correspondence table:

ATP annex 1, appendix 2, 7.2			Heat exchanger 1	Heat exchanger 2	Cooling capacity
Test naming	**What**	**Goal**	**Test number**		**[W]**
Pnominal	Unit	(0/0)	1	/	∑
Pnominal	Unit	(-20/-20)	3	3	∑
Pindividual	Heat exchanger 1	(0/Nul)	1	/	∑
Pindividual	Heat exchanger 1	(-20/Nul)	2	/	∑
Pindividual	Heat exchanger 2	(Nul/0)	/	3	∑
Pindividual	Heat exchanger 2	(Nul/-20)	/	/	**/**
Premaining	Heat exchanger 1	(-20/0)	3	3	**7.2**
Premaining	Heat exchanger 2	(0/-20)	/	/	**/**

16. Principle of the dimensioning of equipment with a single-emitter, dual-temperature refrigerated unit.

17. The idea is to consider the calorimeter boxes used to carry out the tests to be equipment and to apply the requirements of annex 1, appendix 1, section (6) (c) to them. For this reason, only calorimeter boxes’ average surface area will be considered.

II. Justification

18. These considerations underscore that the methodology for testing single-emitter, dual-temperature units must take into account the type of refrigeration unit, while adjusting the ATP requirements to the constraints imposed by the technology.

III. Cost

19. Official ATP test stations will be required to adapt their methods of testing to comply with the methodology described above. The impact of doing so, which are necessary for meeting manufacturers' needs, should require only modest investment.

IV. Feasibility

20. Official ATP test stations should plan for a period of monitoring of the methodology proposed above to ensure its correct implementation.

V. Enforceability

21. No problems are foreseen in implementing the proposed methodology.