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Item 5 (b) of the provisional agenda
Proposals of amendments to ATP:
new proposals

Proposal to amend Annex 1, Appendix 2, paragraphs 7.3.2, 7.3.3 and 7.3.4 Reference of multitemp calculations

Submitted by the Government of Germany

Summary

Executive summary:	Clarification that all multitemp calculations in chapters 7.3.3 ff. should refer to the inside surface area of the respective chambers
Action to be taken:	Annex 1, Appendix 4
Related documents:	None

Introduction

1. Since the implementation of the Finnish proposal of 2014, in order to confirm the FRC classification of the refrigerated vehicle set out in chapter 7.3.2., the calculation of the heat intake through the external body walls has been referring to the average surface area of the external walls of the refrigerated body – as is the case with monotemp vehicles.

2. However, when this proposal was implemented, the information that all multitemp calculations in chapters 7.3.3 ff. should continue to refer to the inside surface area of the respective chambers, was lost. This is to be corrected with this proposal for amendment.

3. The reference to the inside surface area simplifies the calculation in case a configuration has to be calculated by hand.

4. Furthermore, the possibility should be used to standardise the definition of the term “surface area”.

I. Proposed amendment

5. Amend Annex 1, Appendix 2, paragraph 7.3.2 as follows:

7.3.2 Conformity of the entire body

The outer body shall have a K value $K \leq 0.40$ W/m2.K.

The internal surface **area** of the body shall not vary by more than 20 %.

The equipment shall conform to:

$$P_{nominal} > 1.75 * K_{body} * S_{body} * \Delta T$$

Where:

$P_{nominal}$ is the nominal refrigerating capacity of the multi-temperature refrigeration unit,

K_{body} is the K value of the outer body,

S_{body} is the geometric mean surface area of the ~~full~~ **outer** body,

ΔT is the difference in temperature between outside and inside the body.

6. Amend Annex 1, Appendix 2, paragraph 7.3.3 as follows:

7.3.3 Determination of the refrigerating demand of chilled evaporators

With the bulkheads in given positions, the refrigerating capacity demand of each chilled evaporator is calculated as follows:

$$P_{chilled\ demand} = (S_{chilled\text{-}comp} - \Sigma S_{bulk}) * K_{body} * \Delta T_{ext} + \Sigma (S_{bulk} * K_{bulk} * \Delta T_{int})$$

Where:

K_{body} is the K value given by an ATP test report for the outer body,

$S_{chilled\text{-}comp}$ is the **inside** surface **area** of the chilled compartment for the given positions of the bulkheads,

S_{bulk} are the surface~~s~~ **areas** of the bulkheads,

K_{bulk} are the K values of the bulkheads given by the table in paragraph 7.3.7,

ΔT_{ext} is the difference in temperatures between the chilled compartment and +30°C outside the body,

ΔT_{int} is the difference in temperatures between the chilled compartment and other compartments. For unconditioned compartments a temperature of +20°C shall be used for calculations.

7. Amend Annex 1, Appendix 2, paragraph 7.3.4 as follows:

7.3.4 Determination of the refrigerating demand of frozen compartments

With the bulkheads in given positions, the refrigerating capacity demand of each frozen compartment is calculated as follows:

$$P_{frozen\ demand} = (S_{frozen\text{-}comp} - \Sigma S_{bulk}) * K_{body} * \Delta T_{ext} + \Sigma (S_{bulk} * K_{bulk} * \Delta T_{int})$$

Where:

K_{body} is the K value given by an ATP test report for the outer body,

$S_{frozen\text{-}comp}$ is the **inside** surface **area** of the frozen compartment for the given positions of the bulkheads,

S_{bulk} are the surface~~s~~ **areas** of the bulkheads,

K_{bulk} are the K values of the bulkheads given by the table in paragraph 7.3.7,

ΔText is the difference in temperatures between the frozen compartment and +30 °C outside the body,

ΔT_{int} is the difference in temperatures between the frozen compartment and other compartments. For insulated compartments a temperature of +20°C shall be used for calculations.

II. Impact

Cost:	No impact.
Environment:	No impact.
Feasibility:	The proposed amendment can easily be implemented in ATP. A transitional period is not needed.
Enforceability:	No problems are expected.