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

Amendment to Annex 1, Appendix 2 paragraph 1.2, Testing Method C

Submitted by the Government of Spain

Introduction

1. The determination of the surface to be used in the calculation of coefficient K can be very complex and can involve physical parts not well defined by the geometry of the body of the equipment. In the current ATP text, Method C has been introduced for cases where the internal surface can be measured with accuracy, but not the external surface (e.g. panel vans).

2. In informal document INF.2 of the seventy-seventh session, "A scientific background on the iterative methods used in Annex 1, Appendix 2, section 1.2 to determine the value of the surface to be used in the determination of coefficient K in ATP isothermal tests", a topological analysis is included, where it is shown that the accuracy of method C depends on the precision of the value of parameter λ used in the calculations. The proposal included in this document opens an alternative to improve method C, when the actual value of λ can be estimated by physical measurements of the properties of the main thermal insulator of the wall, or by using statistical data of other ATP units of similar features.

3. The present method C is an iterative method that uses for the calculation a value of λ of 0.025 W/m·ºC. This method has been analyzed, and it is considered that can be improved by adding an alternative to estimate de value of the effective conductivity of the walls (λ) needed to apply the method. If a more accurate value of the conductivity λ could be found, a more exact surface value could be obtained, and consequently a more approximate value of coefficient K. Further mathematical justification of the relationship of the accuracy of λ and the accuracy of K can be found in informal document INF.2 of the seventy-seventh session, Section 2, 1st part.

4. The value of λ can be determined by means of a direct measurement of the conductivity on a sample of the insulator. Alternatively, it could also be determined by comparison with data obtained from previous tests of the same model (see informal document INF.2 of the seventy-seventh session, Section 2, 2nd part).

5. Therefore, this proposal opens an alternative to improve Method C, when the actual value of λ can be estimated by physical measurements of the properties of the main thermal insulator of the wall, or by statistical data of other ATP units of similar features (see proposal in paragraph 8).

6. This proposal has been discussed in the last meeting of the IIR Sub-Commission on refrigerated transport (CERTE Meeting) held on the 28-29th April 2021, and the Sub-Commission gave its support to it.

7. No transitional period is necessary for the implementation of these provisions.

Proposal

8. Add at the end of Annex 1, appendix 2, section 1.2, method C the following text (new text underlined):

> Method C. If neither if the above is acceptable to de experts, the internal surface shall be measured according to the figures and formulae in method B.
>
> The K value shall then be calculated based on the internal surface area, taking the insulation thickness as nil. From this K value, the average insulation thickness is calculated from the assumption that λ for the insulation has a value of 0,025 W/m·ºC
>
> $$d = S_i \; x \; \Delta T \; x \; \lambda \; / W$$
>
> Once the thickness of the insulation has been estimated, the external surface area is calculated and de mean surface area is determined. The final K value is derived from successive iteration.
>
> A different value of λ can be used in this method if the actual value of λ can be estimated by physical measurements of the properties of the main thermal insulator of the wall, or by statistical data of other ATP units of similar features.