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Working Party on the Transport
of Perishable Foodstuffs
(Geneva, 30 October-2 November 2000)

Comment to Annex 1, Appendix 2, paragraph 29

Transmitted by the expert from Denmark

Justification

A very controversial subject, which has been discussed extensively in Geneva and IIR Sub-commission D2, is reapproval of heavy insulated equipment in service by use of ageing factors.

There is quite a lot of knowledge in the testing stations on ageing of insulating material, mainly based on Polyurethane foam expanded by means of R11 and R141b. Even if quite spread experiences amongst testing stations, the main impression seem to be an ageing of approx. five percent per year in the range up to nine years of age. This giving calculating factors of 1,30 at six years and 1,45 at nine years of age.

In countries where ageing factors are used, the initial K-value is multiplied by the actual calculation factor, thereby judging if the equipment could be reapproved for a period of three years, without any demand for tunnel testing.

There seem to be a major interest in using ageing factors as a method for reapproval, but that the values should be provisional and frequently corrected and varied, based on new experiences on foams and foaming agents.

Where the opinion is really divided is however the limit used for the "K-value" calculated. Should this be the class limit for heavy insulated vehicles 0,40 W/m^2K or should it be a higher value used strictly for reapproval purpose.

Some countries feel that the limit of 0,40 W/m^2K is inviolable, and others have the more pragmatic view that a higher K-value in praxis is accepted by using the six-hour cool down limit in Annex 1, Appendix 2, paragraph 49 (b).

This cool-down test will still be mandatory, as an important instrument, to detect defective thermal appliances and poor maintained equipment.

The general impression is that most countries are positive to ageing factors, but that they must be followed by a calculation limit above 0,40. A limit of 0,54 has been mentioned several times and it might be a good choice, as this would make reapproval without tunnel testing possible for a six years old vehicle, with an initial K-value of 0,40 (0,40*1,30 = 0,52), but reject it at nine years (0,40*1,45 = 0,58). For reapproval at nine years, the initial K-value must be equal to or less than 0,37 and in this way give a clear signal to the buyers that badly insulated vehicles risks to be asked to fulfil tunnel testing requirement at nine years.

What we however do, by accepting an ageing of 5% per year, is in fact reapproving at six years with an ageing factor for nine years i.e. 1,45 , as this would be the value at the equipment's last day before next reapproval. At nine years we are reapproving to twelve years i.e. a factor of 1,60 assuming that the 5% ageing is extended to this age. This is still on the safe side as ageing of insulation is decreasing with time.

A reasonable demand, when in praxis accepting a calculating limit of 0,54 for equipment in service, would be increasing the so called safety factor for mechanically refrigerated equipment, as described in Annex 1, Appendix 2, paragraph 41.

Increasing this factor from present 1,75 to a range between 2,25 and 2,50 is being discussed in other connexion, but obviously here is another argument.

Refrigerating capacity given according to Annex 1, Appendix 2, paragraph 38, by adding 35% heating capacity, is totally insufficient for reapproval when 5% ageing is acknowledged, as this represents a safety factor of just 1,35. It must therefore be required that equipment at reapproval at least comply with the requirements in Annex 1, Appendix 2, paragraph 41 (safety factor 1,75).

For safe transport it would be reasonable to consider 35% overcapacity as a minimum demand at the last day whereto the equipment is reapproved. Without going into details, the above factors: Ageing in fact nine years at six years and twelve years at nine years, in combination with a requirement of 35% overcapacity at last reapproval date, would lead to a safety factor in the range of 2,15.

Proposal

Comment to Annex 1, Appendix 2, paragraph 29 (a):

For well-maintained equipment, applying the testing method, as described in paragraphs 7 to 27 of this appendix, can be omitted provided that following can be fulfilled:

- For equipment six years of age: The initial K-value, for the equipment when new, multiplied by 1,30 is below 0,54.

- For equipment nine years of age: The initial K-value, for the equipment when new, multiplied by 1,45 is below 0,54.

- In all cases mechanically refrigerated equipment must comply with the specifications given in paragraph 41 to this Appendix.
