UNITED
NATIONS

E

Economic and Social
Council

Distr.
GENERAL

TRANS/WP.11/2000/8
21 August 2000
Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

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

RE-DRAFT OF ANNEX 1 TO ATP

Prepared by consultants

Note by the Secretariat

1. As requested by the Working Party on the Transport of Perishable Foodstruffs at its fifty-fifth session, the consultants (Mr. R. Heap and Mr. C. Bowyer) prepared a new version of Annex 1 to ATP taking into account the comments made by the Working Party; namely:

   - use of "t" for temperature and "T" for time (ISO standard);
   - reference to the definition for lorries used in the 1958 Agreement;
   - taking into account the presentation in informal document INF.7 (Germany); and
   - separation of requirements; for characteristics of the equipment (insulating, cooling, refrigerating, heat-generating);
   - for test methods applied by laboratories; and
   - for approval procedures for new equipment and renewal of approval for equipment in service. (see TRANS/WP.11/200, para. 43).

2. The secretariat reproduces below the work done by the consultants with changes between brackets and with references to the old texts at the beginning of paragraphs to facilitate comparison.

3. For the index of the new Annex 1, as proposed, see document TRANS/WP.11/2000/11.

Annex 1

DEFINITIONS OF AND STANDARDS FOR SPECIAL EQUIPMENT [1/] FOR THE CARRIAGE OF PERISHABLE FOODSTUFFS

1. Insulated equipment. Equipment of which the body [2/] is built with insulating walls, doors, floor and roof, by which the movement of heat between the inside and outside of the body can be so limited that the overall coefficient of heat transfer (K coefficient) is such, that the equipment is graded in one or other of the following two categories:

I_N = Normally insulated equipment

- specified by a K coefficient equal to or less than 0.70 $W/m^2°K$

I_R = Heavily insulated equipment

- specified by a K coefficient equal to or less than 0.40 $W/m^2°K$, and by side-walls with a thickness of at least 45 mm for transport equipment of a width greater than 2.50 m.

[**Delete the last but one sentence in paragraph 1**].

The definition of the K coefficient and a description of the method to be used in its measurement, are given in appendix 2 to this annex.

2. Refrigerated equipment. Insulated equipment which, using a source of cold (natural ice, with or without the addition of salt; eutectic plates; dry ice, with or without sublimation control; liquefied gases, with or without evaporation control, etc.) other than a mechanical or "absorption" refrigeration unit, is capable, with a mean outside temperature of +30 °C, of lowering the inside temperature of the empty body to, and thereafter maintaining it:

At +7 °C maximum in the case of class A;

At -10 °C maximum in the case of class B;

At -20 °C maximum in the case of class C; and

At 0 °C maximum in the case of class D,

[**1/ These provisions shall apply to vehicles of categories N and O as defined in annex 7 of the Consolidated Resolution on construction of vehicles (RE3). Wagons, trailers, semi-trailers, containers, swap-bodies and similar equipment.]**

2/ In the case of tank equipment, the term “body” means under this definition, the tank itself

[Delete footnote 3/.]

[**If such equipment includes**] one or more compartments, receptacles or tanks to accommodate the refrigerant, the compartments, receptacles or tanks [**shall:**]

Be capable of being filled or refilled from the outside; and

Have a capacity in conformity with the provisions of annex l, appendix 2, paragraph [**3.1.3**].

The K coefficient of refrigerated equipment of classes B and C shall in every case be equal to or less than 0.40 $W/m^2°K$.

3. Mechanically refrigerated equipment. Insulated equipment either fitted with its own refrigerating appliance, or served jointly with other units of transport equipment by such an appliance (fitted with either a mechanical compressor or an "absorption" device). The appliance shall be capable, with a mean outside temperature of +30 °C, of lowering the temperature T_i inside the empty body to, and thereafter maintaining it continuously in the following manner at:

In the case of classes A, B and C, any desired practically constant inside temperature t_i in conformity with the standards defined below for the three classes:

Class A. Mechanically refrigerated equipment fitted with a refrigerating appliance such that T_i may be chosen between +12 °C and 0 °C inclusive.

Class B. Mechanically refrigerated equipment fitted with a refrigerating appliance such that T_i may be chosen between +12 °C and - 10 °C inclusive.

Class C. Mechanically refrigerated equipment fitted with a refrigerating appliance such that T_i may be chosen between +12 °C and - 20 °C inclusive.

In the case of classes D, E and F a practically constant fixed inside temperature T_i in conformity with the standards defined below for the three classes:

Class D. Mechanically refrigerated equipment fitted with a refrigerating appliance such that T_i is equal to or less than 0 °C.

Class E. Mechanically refrigerated equipment fitted with a refrigerating appliance such that T_i is equal to or less than - 10 °C.

Class F. Mechanically refrigerated equipment fitted with a refrigerating appliance such that T_i is equal to or less than - 20 °C.

In the case of classes D, E and F a practically constant fixed inside temperature T_i in conformity with the standards defined below for the three classes:

Class D. Mechanically refrigerated equipment fitted with a refrigerating appliance such that T_i is equal to or less than 0 °C.

Class E. Mechanically refrigerated equipment fitted with a refrigerating appliance such that T_i is equal to or less than - 10 °C.

Class F. Mechanically refrigerated equipment fitted with a refrigerating appliance such that T_i is equal to or less than - 20 °C.

The K coefficient of equipment of classes B, C, E and F shall in every case be equal to or less than 0.40 $W/m^2°K$.

[**In paragraph 3. All "t" temperatures are changed to "T"; the last sentence of Class F is separated from the first sentence**.]

4. Heated equipment. Insulated equipment, [**which when**] fitted with a heat-producing appliance, is capable of raising the [**inside temperature**] of the empty body to, and thereafter maintaining it, for not less than 12 hours, at a practically constant value of not less than + 12 °C when the mean outside temperature, [**as indicated below is:**

- 10 °C in the case of class A heated equipment;

- 20 °C in the case of class B heated equipment;]

[**Heat producing appliances shall have a capacity in conformity with the provisions of annex 1, appendix 2, paragraphs 3.3.1 to 3.3.5.**] (new)

The K coefficient of equipment of class B shall in every case be equal to or less than 0.40 $W/m^2°K$.

[Paragraph 5, is deleted].

Annex 1. Appendix 1

PROVISIONS RELATING TO THE CHECKING OF INSULATED, REFRIGERATED, MECHANICALLY REFRIGERATED OR HEATED EQUIPMENT FOR COMPLIANCE WITH THE STANDARDS

l. Checks for conformity with the standards prescribed in this annex shall be made:

(a) before equipment enters into service;

(b) periodically, at least once every six years;

(c) whenever required by the competent authority.

Except in the cases provided for in appendix 2, [**paragraphs 5 to 5.3 and 6 to 6.4,**] to this annex, the checks shall be made at a testing station designated or approved by the competent authority of the country in which the equipment is registered or recorded, unless, in the case of the check referred to in (a) above, a check has already been made on the equipment itself or on its prototype in a testing station designated or approved by the competent authority of the country in which the equipment was manufactured.

New text	Original text
Paragraph 1 beginning of final sentence appendix 2, paragraphs 29 and 49 become paragraphs 5 to 5.3 and 6 to 6.4	
	Paragraph 2 is moved to the end of the appendix becoming paragraph 6.
	Old para.3 becomes new para.2 .
	Old para.4 becomes new para.3
	Old para.5 becomes new para.4
	Old para.6 becomes new para.5

2. [**old 3.]** The methods and procedures to be used in checking for compliance with the standards are described in appendix 2 to this annex.

3. [**old 4**.]A certificate of compliance with the standards shall be issued by the competent authority of the country in which the equipment is to be registered and recorded on a form conforming to the model reproduced in appendix 3 to this annex.

In the case of equipment transferred to another country which is a Contracting Party to ATP it shall be accompanied by the following documents so that the competent authority of the country in which the equipment is to be registered or recorded can issue an ATP certificate:

(a) in all cases, the test report - of the equipment itself or, in the case of serially produced equipment, of the reference equipment;

(b) in all cases, the ATP certificate issued by the competent authority of the country of manufacture or, for equipment in service, the competent authority of the country of registration. This certificate

will be treated as a provisional certificate valid, if necessary, for three months;

(c) in the case of serially produced equipment, the technical specification of the equipment to be certified (this specification must cover the same items as the descriptive pages concerning the equipment which appears in the test report).

In the case of equipment transferred after it has been in use, the equipment may be subject to a visual inspection to confirm its identity before the competent authority of the country in which it is to be registered or recorded issues a certificate of compliance. The certificate or a certified true photographic copy shall be carried on the equipment during carriage [**to**] be produced whenever so required by control authorities. However if [**a**] certification plate, [**as**] reproduced in appendix 3 to this annex, is fixed to the equipment, the [**ATP plate**] shall be recognised as equivalent to a certificate. [**ATP certification plates**] shall be removed as soon as the equipment ceases to conform to the standards laid down in this annex.

[**Delete the last sentence of old para. 4**].

4. [**old 5**.] [**Classification**] distinguishing marks and particulars shall be affixed to the equipment in conformity with the provisions of appendix 4 to this annex. They shall be removed as soon as the equipment ceases to conform to the standards laid down in this annex.

5. [**old 6**.] The insulated bodies of "insulated", "refrigerated", "mechanically refrigerated" or "heated" transport equipment and their thermal appliances shall each bear permanent distinguishing marks affixed by the manufacturer and including at least the following particulars:

Country of manufacture or letters used in international road traffic;

Name of manufacturer or company;

Model (figures and/or letters);

Serial number;

Month and year of manufacture.

6. [**old 2**.] (a) New equipment of a specific type serially produced may be approved by testing one unit of that type. If the unit tested meets class specifications, the resulting test report shall be regarded as a Type Approval Certificate. This certificate shall expire at the end of a period of six years.

(b) The competent authority shall take steps to verify that production of other units is in conformity with the approved type. For this purpose it may check by testing sample units drawn at random from the production series.

(c) A unit shall not be regarded as being of the same type as the unit tested unless it satisfies the following minimum conditions:

(i) If it is insulated equipment, in which case the reference equipment may be insulated, refrigerated, mechanically refrigerated or heated equipment,

the construction shall be comparable and, in particular, the insulating material and the method of insulation shall be identical;

the thickness of the insulating material shall not be less than that of the reference equipment;

the interior fittings shall be identical or simplified;

the number of doors and the number of hatches or other openings shall be the same or less; and

the inside surface area of the body shall not vary more than 20% greater or smaller.

(ii) If it is refrigerated equipment, in which case the reference equipment shall be refrigerated equipment,

the conditions set out under (i) above shall be satisfied;

inside circulating fans shall be comparable;

the source of cold shall be identical; and

the reserve of cold per unit of inside surface area shall be greater or equal.

(iii) If it is mechanically refrigerated equipment, in which case the reference equipment shall be either:

(a) mechanically refrigerated equipment,

- the conditions set out in (i) above shall be satisfied; and

- the effective refrigerating capacity of the mechanical refrigeration appliance per unit of inside surface area, under the same temperature conditions, shall be greater or equal, or:

(b) insulated equipment [**which is complete in every detail, but minus its mechanical refrigeration unit**] which will be fitted at a later date. [**The resulting aperture**] will be filled, during the measurement of the K coefficient, with close fitting panels of the same overall thickness and type of insulation as is fitted to the front wall. In which case:

- the conditions set out in (i) above shall be satisfied; and

- the effective refrigerating capacity of the mechanical refrigeration unit fitted to insulated reference equipment shall be treated as defined in annex 1, appendix 2, paragraph [**3.2.6.**].

(iv) If it is heated equipment, in which case the reference equipment may be insulated or heated equipment,

- the conditions set out under (i) above shall be satisfied;

- the source of heat shall be identical; and

- the capacity of the heating appliance per unit of inside surface area shall be greater or equal

(d) If, in the course of the six year period, the production series exceeds 100 units, the competent authority shall determine the percentage of units to be tested.

Annex 1, Appendix 2

METHODS AND PROCEDURES FOR MEASURING AND CHECKING THE INSULTATING CAPACITY AND THE [**EFFECTIVENESS**] OF THE COOLING OR HEATING APPLICANCES OF SPECIAL EQUIPMENT FOR THE CARRIAGE OF PERISHABLE FOODSTUFFS

1. DEFINITIONS AND GENERAL PRINCIPLES

New text	Original text
	Heading A becomes heading 1.
	Para. 1 becomes para. 1.1
	$\Delta\theta$ becomes ΔT
	θ becomes T
	Para. 2 becomes para. 1.2.
Heading "Temperature measuring points" added	
	Para. 3 becomes para. 1.3.
	θ_i becomes T_i
	Para. 4 becomes para.1.4.
	θ_e becomes T_e

1.1. [**old para 1**.]K coefficient. The overall [**heat transfer coefficient (K coefficient) of the special equipment**], is defined by the following formula:

$$K = \frac{W}{S \cdot \Delta T}$$ where W is [**either the heating power or the cooling capacity, as the case may be, required to maintain a constant absolute temperature difference**] ΔT between the mean inside temperature T_i and the mean outside temperature T_e during continuous operation, when the mean outside temperature T_e is constant, [**for a body of mean surface area S]**.

1.2. [**old para 2.]**The mean surface area S of the body is the geometric mean of the inside surface area S_i and the outside surface area S_e of the body:

$$S = \sqrt{S_i \cdot S_e}$$

In determining the two surface areas S_i and S_e, structural peculiarities and surface irregularities of the body, such as [**chamfers**], wheel-arches and [**similar features**], shall be taken into account and shall be noted under the appropriate heading in [**test reports**]; however, if the body is covered with corrugated sheet metal the area considered shall be that of the plane surface occupied [~~thereby~~], not that of the developed corrugated surface.

[**Temperature measuring points**] (New)

1.3. [**old 3.**] In the case of parallelepipedic bodies, the mean inside temperature of the body (T_i) is the arithmetic mean of the temperatures measured 10 cm from the walls at the following 12 points:

(a) the eight inside corners of the body; and

(b) the centres of the four inside faces having the largest area.

If the body is not parallelepipedic, the 12 points of measurements shall be distributed as satisfactorily as possible having regard to the shape of the body.

1.4. [**old 4**.] In the case of parallelepipedic bodies, the mean outside temperature of the body (T_e) is the arithmetic mean of the temperatures measured 10 cm from the walls at the following 12 points:

(a) the eight outside corners of the body;

(b) the centres of the four outside faces having the largest area.

New text	Original text
	Para. 5 becomes para.1.5.
	$\theta_e+\theta_i$ becomes T_e+T_i
Para.1.6. is moved from para. 11	
	Para. 6. Becomes para. 1.7.
	°C is replaced by °K where appropriate
	Heading B becomes heading 2
	Sub-heading (a) becomes sub-heading 2.1
	Para.7. becomes para. 2.1.1. (insulating capacity replaced by K coefficient.
	Para. 8 becomes para.2.1.4. with its last sentence and footnote deleted.
Para 2.1.2. was para. 10	

1.5. [**old 5.]** The mean temperature of the walls of the body is the arithmetic mean of the mean outside temperature of the body and the mean inside temperature of the body:

$$\frac{T_e + T_i}{2}$$

[**1.6. Temperature measuring instruments protected against radiation shall be placed inside and outside the body at the points specified in paragraphs 1.3 and 1.4 of this appendix.] [old para 11].**

[Steady state period and duration of test.]

1.7. **[old 6.]** The mean outside temperatures and the mean inside temperatures of the body, taken over a steady period of not less than 12 hours, shall not vary by more than ± 0.3°[**K**], and these temperatures shall not vary by more than ± 1.0°[**K**] during the preceding 6 hours.

The difference between the [**heating power or cooling capacity**] measured over two periods of not less than 3 hours at the start and at the end of the steady state period, and separated by at least 6 hours, shall be less than 3%.

The mean values of the temperatures and thermal capacity over at least the last 6 hours of the steady state period shall be used in K coefficient calculation.

The mean [**inside and outside**] temperatures at the beginning and [**end**] of the calculation period of at least 6 hours shall not differ by more [**than**] 0.2°[**K**].

2. [Old B.]INSULATING CAPACITY OF EQUIPMENT

Procedures for measuring the K coefficient

2.1 [old (a)] Equipment other than liquid-foodstuffs tanks

2.1.1. [**old 7.]** [**K coefficients**] shall be measured in continuous operation either by the internal cooling method or by the internal heating method. In either case, the empty body shall be placed in an insulated chamber.

[**Test Method**]

2.1.2 [**old 10**.]Where the internal cooling method is [**used**], one or more heat exchangers shall be placed inside the body. The surface area of these exchangers shall be such that, if a fluid at a temperature not lower than 0 °C */ passes through them, the mean inside temperature of the body remains below + 10 °C when continuous operation has been established. Where the internal heating method is [**used,]** electrical heating appliances (resistors [**etc.])** shall be used. The heat exchangers or electrical heating appliances shall be fitted with [**fans**] having a delivery rate sufficient to obtain 40 to 70 air changes per hour related to the empty volume of the tested body, and the air distribution around all [**inside**] surfaces of the tested body shall be sufficient to ensure that the maximum difference between the temperatures of any 2 of the 12 points specified in paragraph [**1.3**] of this appendix does not exceed [**2 °K**] when continuous operation has been established.

_____

*/ to prevent frosting.

New text	Original text
Para.2.1.3. was para.54(e)	
	1st sentence of para.8 is now para.2.1.4.
	1st sentence of para.9 deleted remainder becomes para.2.1.5.
	Para.10 becomes para.2.1.2.
	Para.11 becomes para.1.6.
	Para.12 becomes para.2.1.6
	Para.13 becomes para.2.1.7
	Para.14 becomes para.2.1.8.
Sub-heading 2.2 was sub-heading (b)	
Para.2.2.1. was para.16	
Para.2.2.2 was para.17 (insulating capacity replaced by K coefficient).	

[2.1.3 Heat Quantity: The heat dissipated by the [electrical resistance] fan heaters [~~fitted with electrical resistances~~] shall not exceed a flow of 1W/cm^2 and the heater units shall be protected by a casing of low emmissivity.] [old 54. (e)]

[Test Procedure]

2.1.4 [**old para 8**.]Whatever the method employed, the mean temperature of the insulated chamber shall throughout the test be kept uniform, and constant [**in compliance with paragraph 6 of this appendix,]** and at a level such that the temperature difference between the inside of the [**body**] and the insulated chamber is 25 °C± 2°[**K**], the [**average**] temperature of the walls of the body being maintained at 20 °C± 0.5 °[**K**].

[The second sentence of old para 8. is deleted].

2.1.5. **[from para 9., second sentence]** During the test, whether by the internal cooling method or by the internal heating method, [**the mass of air in**] the chamber shall be made to circulate continuously so that [**its**] speed of movement 10 cm from the walls is maintained between l and 2 metres/second.

2.1.6. [**old para 12.]** The appliances for generating and distributing cold or heat and for measuring the quantity of cold or heat exchanged and the heat equivalent of the air-circulating fans shall be started up. Electrical cable losses between the heat input measuring instrument and the tested body shall be established by a measurement or calculation and subtracted from the total heat input measured.

2.1.7. [**old para 13.]** When continuous operation has been established, the maximum difference between the temperatures at the warmest and at the coldest points on the outside of the body shall not exceed 2 °[**K**].

2.1.8. [**old para 14.]** The mean outside temperature and the mean inside temperature of the body shall each be read not less than four times per hour.

[old para 15 is deleted.]

2.2 [old (b)] Liquid-foodstuffs tanks

2.2.1. [**old para 16.]** The method described below applies only to single-compartment or multiple-compartment tank equipment intended solely for the carriage of liquid foodstuffs such as milk. Each compartment of such tanks shall have at least one manhole and one discharge-pipe connecting socket; where there are several compartments they shall be separated from one another by non-insulated vertical partitions.

2.2.2. [**old para. 17.]** [**K coefficients**] shall be measured in continuous operation by internal heating of the empty tank in an insulated chamber.

New text	Original text
Para. 2.2.3 has new sub-heading "Test Method" and replaces para.20 (Heat exhanger is replaced by electrical heating appliance) text changed to parallel non-tank test method.	
Para.2.2.4 replaces para. 21.	
	Para. 15 is deleted
	Para. 16 becomes para.2.2.1
	Para. 17 becomes para. 2.2.2.
	Para. 18 becomes para. 2.2.5 and is sub-headed "test procedure". The last sentence is deleted together with its footnote.
	Para. 19 becomes para. 2.2.6 and the text is changed from atmosphere to mass of air.

[Test method]

2.2.3. [**old para. 20**.] [**An electrical heating appliance (resistors etc.)] shall be placed inside the tank. If the tank has several compartments, [an electrical heating appliance]** shall be placed in each compartment. The [**electrical heating appliances]** shall be fitted with [**fans**] with a delivery rate sufficient to obtain 40 to 70 air changes per hour related to the empty volume of the tested body, and the air distribution around all inside surfaces of the tested body shall be sufficient to ensure that the difference between the maximum temperature and the minimum temperature inside each compartment does not exceed 2 °[**K**] when continuous operation has been established. If the tank comprises several compartments, the difference between the mean temperature in the coldest compartment and the mean temperature in the warmest compartment shall not exceed 2 °[**K**], the temperatures being measured as specified in paragraph [**2.2.4**] of this appendix.

2.2.4. [**old para. 21.]** Temperature measuring instruments protected against radiation shall be placed inside and outside the tank 10 cm from the walls, as follows:

(a) If the tank has only one compartment, measurements shall be made at a minimum of 12 points positioned as follows:

The four extremities of two diameters at right angles to one another, one horizontal and the other vertical, near each of the two ends of the tank;

The four extremities of two diameters at right angles to one another, inclined at an angle of 45° to the horizontal, in the axial plane of the tank.

(b) If the tank has several compartments, the points of measurement shall be as follows:

for each of the two end compartments, at least the following:

The extremities of a horizontal diameter near the end and the extremities of a vertical diameter near the partition;

and for each of the other compartments, at least the following:

The extremities of a diameter inclined at an angle of 45° to the horizontal near one of the partitions and the extremities of a diameter perpendicular to the first and near the other partition.

The mean inside temperature and the mean outside temperature of the tank shall respectively be the arithmetic mean of all the measurements taken inside and all the measurements taken outside the tank. In the case of a tank having several compartments, the mean inside temperature of each compartment shall be the arithmetic mean of the measurements, numbering not less than four, relating to that compartment.

New text	Original text
Para.2.2.5 was the 1st sentence of para.18.	
Para.2.2.6. was para.19	
Para.2.2.7. was para.22	
Para.2.2.8 was para.23	
Para.2.2.9. was para.24	
	Para.25 is deleted
	Sub-heading (c) becomes sub-heading 2.3 "Provisions common to all types of insulated equipment".
Para.2.3.1. was (i) para.26, with the reference to paras.7 to 25 changed to paras.2.1.1. to 2.2.9.	
Para.2.3.2. was (ii) para.27	
	Para.28 is deleted

[Test procedure]

2.2.5. **[old para 18., first sentence]**Throughout the test, the **[mean]** temperature of the insulated chamber shall be kept uniform, and constant **[in compliance with paragraph 6 of this appendix]**, at a level such that the difference in temperature between the inside of the tank and **[that of]** the insulated chamber is not less than 25°C± 2°[**K**], with the average temperature of the **[tank]** walls being **[maintained]** at +20 °C ± 0.5 °[**K**].

[Para 18., second sentence, is deleted].

2.2.6 **[old para. 19]** The [**mass of air**] in the chamber shall be made to circulate continuously so that the speed of movement at 10 cm from the walls is maintained between l and 2 metres/second.

2.2.7 **[old para 22.]** The appliances for heating and circulating the air and for measuring the quantity of heat exchanged and the heat equivalent of the air-circulating fans shall be started up.

2.2.8. **[old para 23.]** When continuous operation has been established, the maximum difference between the temperatures at the warmest and at the coldest points on the outside of the tank shall not exceed 2 °[**K**].

2.2.9 **[old para 24.]** The mean outside temperature and the mean inside temperature of the tank shall each be read not less than four times per hour.

[old para. 25 is deleted].

2.3 [old (c)] Provisions common to all types of insulated equipment

2.3.1 **[old para. 26.]** Verification of the K coefficient. Where the purpose of the tests is not to determine the K coefficient but simply to verify that it is below a certain limit, the tests carried out as described in paragraphs **[2.1.1. to 2.2.9.]** of this appendix may be stopped as soon as the measurements made show that the K coefficient meets the requirements.

2.3.2. **[old para. 27.]** Accuracy of measurements of the K coefficient. Testing stations shall be provided with the equipment and instruments necessary to ensure that the K coefficient is determined with a maximum margin of error of ± 10% when using the method of internal cooling and ± 5% when using the method of internal heating.

[old para. 28 is deleted].

New text	Original text
Heading 3 replaces heading C, with "Effectiveness" replacing "Efficiency" in the text of the heading.	
	Para.31 is deleted.
Refrigerated equipment is given Sub-heading 3.1.	
Para.3.1.1 was para.32, with the reference to para.9. being replaced with para.2.1.5.	
Para.3.1.2 was para.33, with the reference to paras.3 and 4, being replaced by paras. 1.3 and 1.4.	
A new sub-heading "Test procedure" is added	
Paras.3.1.3. (a), (b) and (c) were paras.34 (a), (b) and (c).	

3. [EFFECTIVENESS] OF THERMAL APPLIANCES OF EQUIPMENT

Procedures for determining the [effectiveness] of thermal appliances of equipment

3.1. Refrigerated equipment

3.1.1. **[old para 32]** The empty equipment shall be placed in an insulated chamber whose mean temperature shall be kept uniform, and constant to within ± 0.5 **°[K**], at + 30 °C. The [**mass of air in**] the chamber shall be made to circulate as described in paragraph **[2.1.5]** of this appendix.

3.1.2 **[old para 33.]** Temperature measuring instruments protected against radiation shall be placed inside and outside the body at the points specified in paragraphs **[1.3 and 1.4]** of this appendix.

[Test procedure] (new)

3.1.3. **[old para 34.]** (a) In the case **of <u>equipment other than equipment with fixed eutectic plates, and equipment fitted with liquefied gas systems</u>**, the maximum weight of refrigerant specified by the manufacturer or which can normally be accommodated shall be loaded into the spaces provided when the mean inside temperature of the body has reached the mean outside temperature of the body (+30°C). Doors, hatches and other openings shall be closed and inside ventilation appliances (if any) of the equipment shall be started up at maximum capacity. In addition, in the case of new equipment, a heating appliance with a heating capacity equal to 35% of the heat exchanged through the walls in continuous operation shall be started up inside the body when the inside temperature prescribed for the class to which the equipment is presumed to belong has been reached. No additional refrigerant shall be loaded during the test.

(b) In the case of **<u>equipment with fixed eutectic plates</u>**, the test shall comprise a preliminary phase of freezing of the eutectic solution. For this purpose, when the mean inside temperature of the body and the temperature of the plates have reached the mean outside temperature (+30°C), the plate cooling appliance shall be put into operation for 18 consecutive hours after closure of the doors and hatches. If the plate-cooling appliance includes a cyclically-operating mechanism, the total duration of operation of the appliance shall be 24 hours. In the case of new equipment, as soon as the cooling appliance is stopped, a heating appliance with a heating capacity equal to 35% of the heat exchanged through the walls in continuous operation shall be started up inside the body when the temperature prescribed for the class to which the equipment is presumed to belong has been reached. The solution shall not be subjected to any re-freezing operation during this test.

(c) In the case of **<u>equipment fitted with liquefied gas systems</u>**, the following test procedure shall be used: when the mean inside temperature of the body has reached the mean outside temperature (+30°C), the receptacles for the liquefied gas shall be filled to the level prescribed by the manufacturer. Then the doors, hatches and other openings shall be closed as in normal operation and inside ventilation appliances (if any) of the equipment shall be started up at maximum capacity.

The thermostat shall be set at a temperature not more than 2 degrees below the limit temperature of the presumed class of the equipment. Cooling of the body then shall be commenced. During the cooling of the body the refrigerant consumed is simultaneously replaced. This replacement shall be effected:

Either for a time corresponding to the interval between the commencement of cooling and the moment when the temperature prescribed for the class to which the equipment is presumed to belong is reached for the first time;

or for a duration of three hours counting from the commencement of cooling, whichever is shorter.

Beyond this period of time, no additional refrigerant shall be loaded during the test.

In the case of new equipment, a heating appliance with a heating capacity to 35% of the heat exchanged through the walls in continuous operation shall be started up inside the body when the class temperature has been reached.

New text	Original text
New sub-heading " Provisions common to all types of refrigerated equipment".	
Para.3.1.4. was para.35	
Para.3.1.5. was the !st sentence of para.36	
Para.3.1.6. has a sub-heading "Criterion of satisfaction", as is the last sentence of para.36.	
	Mechanically refrigerated equipment now has a new sub-heading 3.2.
Para.3.2.1. was para.37 with a new sub-heading "Test Method"	
Para.3.2.2 was para.38 with a new sub-heading "Test Procedure"	

Provisions common to all types of refrigerated equipment

3.1.4 **[old para 35.]** The mean outside temperature and the mean inside temperature of the body shall each be read not less often than once every 30 minutes.

3.1.5. **[old para 36, first sentence]** The test shall be continued for 12 hours after the mean inside temperature of the body has reached the lower limit prescribed for the class to which the equipment is presumed to belong (A = + 7 °C; B = - 10 °C; C = - 20 °C; D = 0 °C) or, in the case of equipment with fixed eutectic plates, after stoppage of the cooling appliance.

[Criterion of satisfaction] (new)

3.1.6 **[old para. 36, second sentence]** The test shall be deemed satisfactory if the mean inside temperature of the body does not exceed the aforesaid lower limit during the aforesaid period of 12 hours.

3.2 Mechanically refrigerated equipment

[Test method]

3.2.1 **[old para 37.]** The test shall be carried out in the conditions described in paragraphs **[3.1.1 and 3.1.2.]** of this appendix.

[Test procedure]

3.2.2. **[old para 38.]** When the mean inside temperature of the body reaches the mean outside temperature (+30°C), the doors, hatches and other openings shall be closed and the refrigerating appliance and the inside ventilating appliances (if any) shall be started up at maximum capacity. In addition, in the case of new equipment, a heating appliance with a heating capacity equal to 35% of the heat exchanged through the walls in continuous prescribed for the class to which the equipment is presumed to belong has been reached.

New text	Original text
Para.3.2.3 was para.39	
Para.3.2.4 was para.40 (except last sentence)	
	The last sentence of para.40 is replaced by para.3.2.5. and is given a new sub-heading "Criterion of satisfaction"
Para.3.2.6 was para.41, except that there is a text change in the third line from the end of the paragraph.	
Para.3.2.7. was para.42. with the references to paras.37 to 40 changed to paras.3.1.1 to 3.1.4., and to para.41 to para.3.2.6.	

3.2.3 **[old para. 39.]** The mean outside temperature and the mean inside temperature of the body shall each be read not less often than once every 30 minutes.

3.2.4. **[old para. 40, except last sentence]** The test shall be continued for 12 hours after the mean inside temperature of the body has reached:

Either the lower limit prescribed for the class to which the equipment is presumed to belong in the case of classes A, B and C (A = 0 °C; B = - 10 °C; C = - 20 °C); or

A level not lower than the upper limit prescribed for the class to which the equipment is presumed to belong in the case of classes D, E, and F (D = 0 °C; E = - 10 °C; F = - 20 °C).

[Criterion of satisfaction] (new)

3.2.5 **[old para. 40, last sentence]** The test shall be deemed satisfactory if the refrigerating appliance is able to maintain the prescribed temperature conditions during the said 12-hour periods, **[with any]** automatic defrosting of the refrigerating unit not being taken into account.

3.2.6. **[old para. 41.]** If the refrigerating appliance with all its accessories has undergone separately, to the satisfaction of the competent authority, a test to determine its effective refrigerating capacity at the prescribed reference temperatures, the transport equipment may be accepted as mechanically refrigerated equipment without undergoing a test to confirm that the effective refrigerating capacity of the appliance in continuous operation exceeds the heat loss through the walls for the class under consideration, multiplied by the factor l.75.

3.2.7 **[old para. 42.]** If the mechanical refrigerating unit is replaced by a unit of a different type, the competent authority may:

(a) require the equipment to undergo the determinations and verifications prescribed in paragraphs [**3.1.1. to 3.1.4**.]; or

(b) satisfy itself that the effective refrigerating capacity of the new mechanically refrigerating unit is, at the temperature prescribed for equipment of the class concerned, at least equal to that of the unit replaced; or

(c) satisfy itself that the effective refrigerating capacity of the new mechanically refrigerating unit meets the requirements of paragraph [**3.2.6**].

New text	Original text
Heated equipment is itemised under 3.3 together with sub-heading "Test method"	
Para.3.3.1 was para.43, with the reference to para.9 being replaced by para.2.1.5	
Para.3.3.2 was para.44 with the reference to paras.3 and 4 being replaced by paras.1.3 and 1.4.	
	A new sub-heading "test procedure" is introduced.
Para.3.3.3. was para.45.	
Para.3.3.4. was para.46	
Para.3.3.5. was the 1st sentence of para.47 with a small text change.	
	The last sentence of para.47 becomes para 3.3.6. under the sub-heading "Criterion of satisfaction".
	Para.48 is deleted

3.3 Heated equipment

[Test Method] (new)

3.3.1. **[old para. 43]** The empty equipment shall be placed in an insulated chamber whose temperature shall be kept uniform and constant at as low a level as possible. The mass of air in the chamber shall be made to circulate as described in paragraph **[2.1.5.]** of this appendix.

3.3.2 **[old para. 44.]** Temperature measuring instruments protected against radiation shall be placed inside and outside the body at the points specified in paragraphs **[1.3 and 1.4**] of this appendix.

[Test procedure] (new)

3.3.3 **[old para. 45.]** Doors, hatches and other openings shall be closed and the heating equipment and the inside ventilation appliances (if any) shall be started up at maximum capacity.

3.3.4. **[old para.46]** The mean outside temperature and the mean inside temperature of the body shall each be read not less often than once every 30 minutes

3.3.5 **[old para. 47]** The test shall be continued for 12 hours after the difference between the mean inside temperature and the mean outside temperature of the body has reached the level corresponding to the conditions prescribed for the class to which the equipment is presumed to belong. **[In the case of new equipment, the above temperature difference must be increased by 35 per cent.]**

[Criterion of satisfaction] (new)

3.3.6. **[old para 47., last sentence]**The test shall be deemed satisfactory if the heating appliance is able to maintain the prescribed temperature difference during the 12 hours aforesaid.

[old para. 48. is deleted.]

New text	Original text
	Heading D replaced by heading 4
	The text of para.51 is re-arranged to become para.4.1.1. under sub-heading 4.1. General principles. $\Delta\theta$ is replaced byΔT.
Sub-heading Test method is added under item 4.2.	
Para.4.2.1 was para.52. All "θ" temperatures are replaced by "T".	

4. PROCEDURE FOR MEASURING THE EFFECTIVE REFRIGERATING CAPACITY W_O OF A UNIT WHEN THE EVAPORATOR IS FREE FROM FROST

4.1 [General principles] (new)

4.1.1. [**old para. 51**] [**When attached to either a calorimeter box or the insulated body of a unit of transport equipment, and operating continuously, this capacity is:**

$$W_o = W_j + U.\,\Delta T$$

where U is the heat leakage of the calorimeter box or insulated body, Watts/°C.

ΔT is the difference between the mean inside temperature T_i and the mean outside temperature T_e of the calorimeter or insulated body (°C),

W_j is the heat dissipated by the fan heater unit to maintain each temperature difference in equilibrium.]

4.2 [Test method] (new)

4.2.1. **[old para. 52]** The refrigeration unit is **[either fitted]** to a calorimeter box, **[or the insulated body]** of a unit of transport equipment.

In each case**, [the heat leakage]** is measured at a single mean wall temperature prior to the capacity test. An arithmetical correction factor, based upon the experience of the testing station, is made to take into account the average temperature of the walls at each thermal equilibrium during the determination of the effective refrigerating capacity.

It is preferable to use a calibrated calorimeter box to obtain maximum accuracy.

Measurements and procedure shall be as described in paragraphs **[1.1 to 2.1.8]** of this appendix; however, it is sufficient to measure U **[the heat leakage only**], the value of this coefficient being defined by the following relationship:

$$U = \frac{W}{\Delta T_m}$$ where:

W is the heating power (in watts) dissipated by the internal heater and fans;

ΔT_m is the difference between the mean internal temperature T_i and the mean external temperature T_e;

U is the heat flow per degree of difference between the air temperature inside and outside the calorimeter box or the body of the transport equipment measured with the refrigeration unit fitted.

The calorimeter box or unit of transport equipment is placed in a test chamber. If a calorimeter box is used, U . ΔT should be not more than 35% of the total effective refrigeration capacity W_o. The calorimeter box or the insulated body of the unit of transport equipment shall be heavily insulated.

New text	Original text
	Para.53 is moved to be part of the test procedure under para.4.3.2.
Para.4.2.2 was para.54. The reference to paras.3.and 4. Now become paras.1.3. and 1.4.	
Para.4.2.3. was para.55. °C changed to °K where appropriate.	

4.2.2 **[old para.54] Instrumentation**

Test stations shall be equipped with instruments to measure the U value to an accuracy of ± 5%. Heat transfer through air leakage should not exceed 5% of the total heat transfer through the calorimeter box or through [**the insulated body of] the unit of transport equipment.** [~~**The refrigerant flow measurement shall be acurate to ± 5%**~~]. The refrigerating capacity shall be determined to an accuracy of ± 10%.

The instrumentation of the calorimeter box or [**the insulated body of**] a unit of transport equipment shall conform to paragraphs [**1.3 and 1.4**] of this appendix. The following are also to be measured:

(a) Air temperatures: At least four thermometers uniformly distributed at the inlet to the evaporator;

At least four thermometers uniformly distributed at the outlet from the evaporator;

At least four thermometers uniformly distributed at the inlet to the condenser;

The thermometers shall be protected against radiation.

(b) Energy consumption: Instruments shall be provided to measure the electrical energy or fuel consumption of the refrigeration unit.

(c) Speed of rotation: Instruments shall be provided to measure the speed of rotation of the compressors and condenser and evaporator fans or to allow these speeds to be calculated where direct measurement is impractical.

(d) Pressure: High precision pressure gauges (accurate to ± 1%) shall be fitted to the condenser and evaporator and to

the compressor inlet when the evaporator is fitted with a pressure regulator.

(e) Heat quantity: The heat dissipated by the electrical resistance fan heaters shall not exceed a flow of 1W/cm^2 and the heater units shall be protected by a casing of low emissivity.

4.2.3 [**old para. 55.**]**Test conditions**

(i) Outside the calorimeter box or [**the insulated body of]** a unit of transport equipment: the air temperature at the inlet to the condenser shall be maintained at 30°C± 0.5° **[K.]**

(ii) Inside the calorimeter box or [**the insulated body of a]** unit of transport equipment (at the air inlet to the evaporator): there shall be three levels of temperature between -25 °C and +12 °C depending on the characteristics of the unit, one temperature level being at the minimum prescribed for the class requested by the manufacturer with a tolerance of ± 1° **[K.]**

The mean inside temperature shall be maintained within a tolerance of ± 0.5° **[K.]** During the measurement of refrigerating capacity, the heat dissipated within the calorimeter box or the insulated body of the unit of transport equipment shall be maintained at a constant level with a tolerance of ± 1%.

When presenting a refrigeration unit for testing, the manufacturer must supply:

- Documents describing the unit to be tested;

- A technical document outlining the parameters that are most important to the functioning of the unit and specify the allowable range;

- The characteristics of the equipment series tested; and

- A statement as to which form(s) of energy shall be used during testing.

New text	Original text
Sub-heading 4.3 Test procedure added.	
Para.4.3.1 was para.56. The reference to para.55 becomes para.4.2.3. °K replaces °C where appropriate.	

4.3 Test procedure

4.3.1. **[old para. 56.]** The test shall be divided into two major parts, the cooling phase and the measurement of the effective refrigerating capacity at three increasing temperature levels.

(a) Cooling phase; the initial temperature of the calorimeter box or transport equipment shall be within ± 3 °[**K**] of the prescribed ambient temperature. It shall then be lowered to [**5° K below the lower limit class temperature**.]

(b) Measurement of effective refrigerating capacity, at each internal temperature level.

A first test shall be carried out, for at least four hours at each level of temperature, under control of the thermostat (of the refrigeration unit) to stabilize the heat transfer between the interior and exterior of the calorimeter box or unit of transport equipment.

A second test shall be carried out without the thermostat in operation in order to determine the maximum refrigerating **[capacity]**, **[with]** the heating power of the internal heater producing an equilibrium condition at each temperature level as prescribed in paragraph **[4.2.3.].**

The duration of the second test shall be not less than four hours.

Before changing from one temperature level to another, the box or unit shall be manually defrosted.

If the refrigeration unit can be operated by more than one form of energy, the tests shall be repeated **[accordingly]**.

If the compressor is driven by the vehicle engine, the test shall be carried out at both the minimum speed and at the nominal speed of rotation of the compressor as specified by the manufacturer.

If the compressor is driven by the vehicle motion, the test shall be carried out at the nominal speed of rotation of the compressor as specified by the manufacturer.

4.3.2.. **[from old para. 53.] [The same procedure shall be followed for the enthalpy method described below, but in this case the heat power dissipated by the evaporator fans at each temperature level must also be measured.] [last sentence of para. 56.]**

[This] method may, **[alternatively**], be used **[to test]** reference equipment. In this case , the effective refrigeration capacity is measured by multiplying the mass flow (m) of the refrigerant liquid by the difference in enthalpy between the refrigerant vapour leaving the evaporator (h_o) and the liquid at the inlet to the evaporator (h_i).

To obtain the effective refrigeration capacity, the **[heat generated by the evaporator]** fans (W_f) is deducted. It is difficult to measure W_f if the **[evaporator]** fans are driven by an external motor, and in this particular case the enthalpy method is not recommended. When the fans are driven by internal electric motors, the electrical power is measured by appropriate instruments with an accuracy of ± 3**%, [with refrigerant flow measurement being accurate to ± 5%.].**

The heat balance is given by the formula:

$W_o = (h_o – h_i)m - W_f$

Appropriate methods are described in standards ISO 917, BS 3122, DIN, NEN etc

An electric heater is placed inside the equipment in order to obtain thermal equilibrium.

New text	Original text
	The last sentence of para.56 becomes the 1st sentence of para.4.3.2 (formerly para.53)
Para.4.3.3. was para.57	
Para.4.3.4 was para.58	

4.3.3 [**Old para. 57.**] **Precautions**

As the tests for effective refrigerating capacity are carried out with the thermostat of the refrigeration unit disconnected, the following precautions must be observed:

If the equipment has a hot gas injection system, it must be inoperative during the test;

With automatic controls of the refrigeration unit which unload individual cylinders (to [**tune the capacity of the refrigeration unit to motor output**]) the test must be carried out with the number of cylinders appropriate for the temperature.

4.3.4. **[old para.58.]Checks**

The following should be verified and the methods used indicated on the test report:

(i) the defrosting system and the thermostat are functioning correctly;

(ii) the rate of air circulation is that specified by the manufacturer;

If the rate of [**air circulation of a refrigeration unit's evaporator fans are to be measured,**] methods capable of measuring total [**delivery volume**] must be used. Use of one of the relevant existing standards, i.e. BS 848, ISO 5801, AMCA 210-85, DIN 24163, NFE 36101, NF X10.102, DIN 4796 is recommended;

(iii) the refrigerant used for tests is that specified by the manufacturer.

New text	Original text
4.4. becomes a sub-heading "Test result"	
Para.4.4.1. was para.59, except that the reference to para.3. becomes para.1.3.	
	Para.60 is deleted

4.4 Test result

4.4.1. **[old para. 59]** The refrigeration capacity for ATP purposes is that relating to the mean internal temperature as determined by the temperature measuring instruments described in paragraph [**1.3**] above, and not that determined by the thermometers placed at the inlet or outlet of the evaporator.

[old para. 60 is deleted.]

New text	Original text
Checking the insulating capacity of equipment in service is included under heading 5	
	The 1st two sentences of para.29 become the introduction under heading 5
Sub-heading 5.1 ,"general examination of equipment was para.29 (a)	
Sub-heading 5.2 , "Examination for air-tightness was para.29 (b)	
Sub-heading 5.3, "Decisions" was Para.29 (c)	

CHECKING THE INSULATING CAPACITY OF EQUIPMENT IN SERVICE

[For the purpose of checking the insulating capacity of each piece of equipment in service as prescribed in appendix 1, paragraphs l (b) and 1 (c), to this annex, the competent authorities may:

Apply the methods described in paragraphs 7 to 27 of this appendix; or

Appoint experts to assess the fitness of the equipment for retention in one or other of the categories of insulated equipment. These experts shall take the following particulars into account basing their conclusions on information as indicated below:] [from the beginning of para. 29.]

5.1 [old para. 29 (a)] General examination of the equipment

This examination shall take the form of an inspection of the equipment to determine the following [~~in the following order~~]:

(i) The general design of the insulated sheathing;

(ii) The method of application of insulation;

(iii) The nature and condition of the walls;

(iv) The condition of the insulated compartment;

(v) The thickness of the walls;

and to make all appropriate observations concerning the [**effective**] insulating capacity of the equipment. For this purpose the experts may cause parts of the equipment to be dismantled and require all documents they may need to consult (plans, test reports, specifications, invoices, etc.) to be placed at their disposal.

5.2 **[old para 29 (b)] Examination for air-tightness** (not applicable to tank equipment)

The inspection shall be made by an observer stationed inside the equipment, which shall be placed in a brightly-illuminated area. Any method yielding more accurate results may be used.

New text	Original text
Sub-heading 5.3 (ii) was para.29 (c) (ii)	
	Para.29 (d) is deleted
	Para.30 is deleted

5.3 [old para. 29 (c)] Decisions

(i) If the conclusions regarding the general condition of the body is favourable, the equipment may be kept in service as insulated equipment of its initial class for a further period of not more than three years. If the conclusions of the expert or experts are not [**acceptable**], the equipment may be kept in service only **[following a satisfactory measurement of K coefficient according to the procedure described in paragraphs 2.1.1 to 2.3.2]** of this appendix; it may be kept in service for a further period of six years.

(ii) If the equipment consists of units of serially-produced equipment of a particular type satisfying the requirements of appendix l, [**paragraph 6**,] to this annex and belonging to one owner, then in addition to an inspection of each unit of equipment the K coefficient of not less than l% of the number of units [**involved**], may be measured in conformity with the provisions of paragraphs [**2.1.1. to 2.3.2.]** of this appendix. If the results of the examinations and measurements are [**acceptable**], all the equipment in question may be kept in service as insulating equipment of its initial class for a further period of six years.

[Old paras. 29. (d) and 30. are deleted.]

New text	Original text
Heading 6 becomes "Verifying the effectiveness of thermal appliances of equipment in service	
	Efficiency is replaced by effectiveness in the heading
	The first sentence of para. 49 becomes the introduction under heading 6
Sub-heading 6.1 was para. 49 (a), with temperature T replacing θ as appropriate	
Sub-heading 6.2 was para. 49 (b)	
Sub-heading 6.3 was para. 49 (c)	

6 VERIFYING THE [EFFECTIVENESS] OF THERMAL APPLIANCES OF EQUIPMENT IN SERVICE

To verify as prescribed in appendix l, paragraphs l (b) and l (c), to this annex the **[effectiveness]** efficiency of the thermal appliance of each item of refrigerated, mechanically refrigerated or heated equipment in service, the competent authorities may:

Apply the methods described in paragraphs **[3.1.1. to 3.3.6.]** of this appendix; or

Appoint experts to apply the following provisions: **[Beginning of old para. 49.]**

6.1 [old para 49 (a)] Refrigerated equipment other than equipment with fixed eutectic accumulators

It shall be verified that the inside temperature of the empty equipment, previously brought to the outside temperature, can be brought to the limit temperature of the class to which the equipment belongs, as prescribed in this annex, and maintained below the limit temperature for a [**time**] period t such that $t \geq \frac{12\Delta T}{\Delta T'}$ in which ΔT is the difference between + 30 °C and the said limit temperature, and ΔT' is the difference between the mean outside temperature during the test and the **[class limit temperature,]**

the outside temperature being not lower than +15 °C. If the results are **[acceptable]**, the equipment may be kept in service as refrigerated equipment of its initial class for a further period of not more than three years.

6.2 [old para. 49 (b)] Mechanically refrigerated equipment

[Checks shall be made to ensure that], when the outside temperature is not lower than + 15 °C, the inside temperature of the empty equipment, which has been previously **[equalized to that outside]**, can be **[reduced to the required class temperature]** within a maximum period of 6 hours:

In the case of equipment in classes A, B or C, to the minimum temperature, as prescribed in this annex;

In the case of equipment in classes D, E or F, to the limit temperature, as prescribed in this annex.

If the results are **[acceptable],** the equipment may be kept in service as mechanically refrigerated equipment of its initial class for a further period of not more than three years.

6.3 [old para. 49 (c)] Heated equipment

It shall be verified that the difference between the inside temperature of the equipment and the outside temperature which governs the class to which the equipment belongs as prescribed in this annex (a difference of 22 °[**K**] in the case of class A and of 32 °[**K**] in the case of class B) can be achieved and be maintained for not less than 12 hours.

If the results are [**acceptable**], the equipment may be kept in service as heated equipment of its initial class for a further period of not more than three years.

New text	Original text
Sub-heading 6.4 was para.49 (d). Except for a change in the text using "effectiveness" instead of "efficiency". Reference to paras.32 to 47 becomes paras.3.3.1 to3.3.6.	
	Para.49 (e) is deleted
	Para.50 is deleted
Heading 7 "Test reports" is added to the text.	

6.4 [old para. 49. (d)] Provisions common to refrigerated, mechanically refrigerated and heated equipment

(i) If the results are [**not acceptable**], refrigerated, mechanically refrigerated or heated equipment may be kept in service in its initial class only if it passes at a testing station the tests described in paragraphs **[3.1.1. to 3.3.6.]** of this appendix; it may then be kept in service in its initial class for a further period of six years.

(ii) If the equipment consists of units of serially-produced refrigerated, mechanically refrigerated or heated equipment of a particular type satisfying the requirements of appendix l, **[paragraph 6]**, to this annex and belonging to one owner, then in addition to an inspection of the thermal appliances to ensure that their general condition appears to be satisfactory, the **[effectiveness]** of the cooling or heating appliances of not less than l% of the number of units may be determined at a testing station in conformity with the provisions of paragraphs **[3.1.1 to 3.3.6]** of this appendix. If the results of the examinations and of the determination of **[efficiency are acceptable]**, all the equipment in question may be kept in service in its initial class for a further period of six years.

[old para.49. (e) and 50. are deleted.]

7. Test Reports

[A test report of the type appropriate to the equipment tested shall be drawn up for each test in conformity with one or other of the models 1 to 6 hereunder.] [from old para. 60].

[TEST REPORT MODEL No 1
Measurement of the Overall Heat Transfer Coefficient]

Prepared in conformity with the provisions of the Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment
to be Used for such Carriage (ATP) Test Report No.....

Approved testing station: Name
Address

Equipment: Type [(1)] ..... Body built by.....
Body Number.....Chassis number.....
Date of construction.....…… Date of entry into service.....
Owned or operated by.. . .....
.....…
……
Submitted by.....…. ….....
.....
Tare Weight[(2)] .....kg Carrying capacity[(2)].....kg
Principal dimensions) Outside: length.....m Inside:length.....m
of body) width/major axis.....m width/major axis.....m
height/minor axis..... .m height/minor axis.....m
Usable internal volume of body .....m^3
Internal volume of each compartment.....m^3.....m^3.....m^3
Total floor area of body (except tanks).....m^2
Total inside surface area S_i of body/tank .....m^2
Inside surface area of each compartment S_{i1}.....S_{i2}.....m^2
Total outside surface area S_e of body/tank..... m^2
Mean surface area: ..... m^2
Specifications of the body /tank walls: [(3)].....

Thicknesses	Top	Bottom	Sides	Front wall
Outside Skin				
Insulation				
Inside skin				

Description of structural peculiarities of the body/tank[(4)].....

Body (non-tank)		Tank	
Rear Doors		Description of Manholes	
Side Doors		Manhole covers	
Vents		Description of discharge piping	
Ice-loading apertures			

Accessories[5]

Testing Method: inside cooling/inside heating[6]

Date and time of closure of equipment's doors and other openings:.....
Averages obtained for ..... hours of continuous operation
(from ..... a.m./p.m. to .....a.m./p.m.): [6]

Total duration of test .....h. Duration of continuous operation .....h

(a) Mean outside temperature of body: T_e = °C ± K
(b) Mean inside temperature of body: T_i = °C ± K
(c) Mean temperature difference achieved: ΔT = K

Maximum temperature spread:
Outside body .....°K Inside body .....°K

Mean temperature of walls of body $\frac{t_e + t_i}{2}$ …°C

Power consumed in exchangers: W_1 .....W;
Power absorbed by fans: W_2.....W;

Overall coefficient of heat transfer calculated by the formula:

Inside-cooling test ; $K = \frac{W_1 - W_2}{S\Delta t}$ Inside-heating test $K = \frac{W_1 + W_2}{S\Delta t}$

Maximum error of measurement with test used .....%

Remarks: [7]

(To be completed only if the equipment does not have thermal appliances:)

According to the above test results, the equipment may be recognized by means of a certificate in accordance with ATP annex 1, appendix 3, valid for a period of not more than six years, with the distinguishing mark IN/IR [6].

However, this report shall be valid as a certificate of type approval within the meaning of ATP annex 1, appendix 1, paragraph 6(a) for a period of not more than six years, that is until

Done at: .....on:..... Testing Officer.....

---

(1) Wagon, lorry, trailer, semi-trailer, container, swap body, tank etc
(2) State source of information
(3) Nature and thickness of materials used in body/tank construction
(4) If there are structural irregularities, show how S_i and S_e were determined
(5) Meat rails, flettner fans etc.
(6) Delete as necessary
(7) If the body is not parallelpipedic, specify the points at which outside and inside temperatures were measured.

TEST REPORT MODEL No. 2

[Determination of the effectiveness of cooling appliances of refrigerated equipment.]

Description of cooling appliance.....
Manufacturer.....

Type..... serial number.....Year of manufacture.....

Nature and nominal filling quantity of refrigerant/eutectic solution(1).....kg
Actual filling of refrigerant used for test..... kg
Filling device (description, where situated; attach drawing if necessary) .....
.....
Ducts and screens/tank for liquefied gases(1); description and dimensions.....
.....
Drive independent/dependent/mains-operated; Cooling appliance removable/not removable (1)

Eutectic Plates:(1)
- Mechanical refrigeration unit: Make.....Type..... No.....
- Make.....Latent heat at freezing temperature.....kJ/kg at.....°C
- Type.....Total cold reserve at freezing temperature.....kJ
- Number and dimensions.....

Inside fans: Description .....Fan power..... ; Delivery rate.....m^3/h

Automatic Devices:……
Accessories.....
Mean temperatures at beginning of test: Inside..... °C ±.....K; Outside ..... °C ±.....K

Power of heat added during test..... W

Date and time of closure of equipment's doors and other openings.....

Record of mean inside temperature T_i and mean outside temperature T_e of body with time.

time hrs	0	1	2	3	4	5	6	7	8	9	10	11	12
T_i													
T_e													

Remarks: .
According to the above test results, the equipment may be recognized by means of a certificate in accordance with ATP annex 1, appendix 3, valid for a period of not more than six years, with the distinguishing mark …….
However, this report shall be valid as a certificate of type approval within the meaning of ATP annex 1, appendix 1, paragraph 6 (a) for a period of not more than six years, that is until.....

Done at:..... on:..... Testing Officer.....

_____

(1) Delete as appropriate

TEST REPORT MODEL No.3

[Determination of the effectiveness of cooling appliances of mechanically refrigerated equipment.]

Manufacturer.....
Type.....serial number.....year of manufacture.....

Drive:independent/dependent/mains-operated; refrigeration unit removable/not removable(1)
Refrigerant and weight of charge.....kg

Refrigeration capacity stated by manufacturer for an outside temperature T_e of + 30 °C and an inside temperature T_i of : 0°C.....; -10°C.....; -20°C.....

	Compressor	Condenser fan	Evaporator fan
Make			
Type			
Number			
Drive			
Power			
RPM			
Delivery volume			

Mean temperatures at beginning of test: Inside.....°C ±.....°K; Outside.....°C±.....°K

K coefficient of insulated body.....W/m^2°C
Power of heat added during test.....W

Date and time of closure of equipment's doors and other openings.....
Pull-down time from beginning of test to attainment of prescribed mean inside temperature.....h

Record of mean inside temperature t_i and mean outside temperature t_e of body with time

Time hrs	0	1	2	3	4	5	6	7	8	9	10	11	12
T_i													
T_e													

Remarks:.....

According to the above test results, the equipment may be recognized by means of certificate in accordance with ATP annex 1, appendix 3, valid for a period of not more than six years, with the distinguishing mark ……

However, this report shall be valid as a certificate of type approval within the meaning of ATP annex 1, appendix 1, paragraph 6 (a), for a period of not more than six years, that is until.....

Done at:.....on:..... Testing Officer.....

(1) Delete as applicable

(2) TEST REPORT MODEL No. 4.
[Determination of the effectiveness of heating appliances of heated equipment.]

Manufacturer.....
Type.....serial number.....year of manufacture.....
Location.....overall area of heat exchange surfaces.....
Effective power rating as specified by manufacturer.....
Drive:independent/dependent/mains operated; heating appliance removable/not removable (1)

Fans: Description.....
Power of electric fans.....W Delivery volume.....m^3/h
Dimensions of ducts: cross-section..... m^2; length..... m

Mean temperatures at beginning of test: Inside ..... °C ±..... K; Outside ..... °C.... ±K

Date and time of closure of equipment's doors and other openings.....
Pull-down time from begining of test to attainment of prescribed mean inside temperature....h

Record of mean inside temperature T_i and mean outside temperature T_e of body with time:

Hrs	0	1	2	3	4	5	6	7	8	9	10	11	12
T_i													
T_e													

Note: In the case of new equipment, the mean inside temperature attained must be increased from +12°C to +20°C for heated class A equipment, and from +12°C to +24°C in the case of heated class B equipment.

Remarks.....
According to the above test results, the equipment may be recognized by means of a certificate in accordance with ATP annex 1, appendix 3, valid for a period of not more than six years, with the distinguishing mark …….

However, this report shall be valid as a certificate of type approval within the meaning of ATP annex 1, appendix 1, paragraph 6 (a), for a period of not more than six years, that is until.....
Done at:.....on:.....Testing Officer.....

_____
(1) Delete as applicable.

TEST REPORT MODEL No. 5
[Determination of the effective refrigeration capacity of a mechanical refrigeration unit.]

Prepared in conformity with the provisions of the Agreement on the International Carriage of Perishable Foodstuffs and on the Special EquipmentTo be used for such carriage
Test Report No.....

Approved testing station.....
.....
Refrigeration unit presented by.....
.....
Manufacturer.....

(a) Technical specifications of the unit: Date of manufacture:..... Type:.....Serial No.... Category[1]: Self-contained/not self-contained
Removable/not removable Single unit/assembled components

Description:.....
.....

Compressor - Make: Type:
Number of cylinders: Cubic capacity:
Nominal speed of rotation: rpm

Methods of drive [1]: electric motor, separate internal combustion engine, vehicle engine, vehicle motion

Compressor drive motor: (See footnotes [1] and [2])
Electrical: Make: Type:
Power: . . .. . kW at.. .....rpm Supply voltage and frequency.. V...Hz

Internal combustion engine: Make:.....Type:.....
Number of cylinders:..... Cubic capacity:.....
Power:..... kW at.....rpm ; Fuel.....… .

Hydraulic motor: Make:..... Type:.....Method of drive:.....

Alternator: Make:..... Type:.....

Speed of rotation: (nominal speed given by the manufacturer:)
……rpm

minimum speed: ……..rpm

Refrigerant fluid:
Expansion valve: Make:.....Model.....Adjustable/Not Adjustable [1]
Defrost Device:
Automatic Device:

Heat exchangers		Condenser	Evaporator
Make			
Type			
Number of circuits			
Number of rows			
Number of tubes			
Fin pitch (mm)[2]			
Tube: nature and diameter (mm)[2]			
Total exchange surface area (m^2)[2]			
Frontal surface area (m^2)			
	Type		
	Number		
	Number of blades per fan		
	Diameter (mm)		
FANS	Nominal power (W) [2,3]		
	Nominal speed rpm		
	Total nominal delivery volume at a pressure of 0 Pa (m^3/h)[2]		
	Method of drive		

Security
Devices:.....
.....
.....
.....….

Results of measurements and effective refrigeration capacity (enthalpy difference method)

(Mean temperature of the air inlet to the condenser . . . . . °C)

Speed of Rotation				**Power of internal fan heater**	**Refrigerant mass flow rate**	**Refrigerant enthalpy at evaporator inlet**	**Refrigerant enthalpy at evaporator outlet**	**Power absorbed by the unit cooler fan**	**Fuel or electrical power consumption**	**Mean temperature around the body**	**Mean temp. air inlet to evaporator**	**Effective refrigerating capacity**
	Fans	Alternator	Compressor									
	rpm	rpm	rpm	W	kg/sec	J/kg	J/kg	W	W or l/hr	°C	°C	W
Diesel												
Electric												

Results of measurements and effective refrigeration capacity (using the heat balance method)

(Mean temperature of the air inlet to the condenser.....±.....°C

N (1) rpm	W_j (2) Watts	C (3) litres/hr	P_m (4) watts	P_c abs (5) bar	P_o abs (6) bar	T_M ext (7) °C	T_m inlet to evap. (8) °C	W_o (9) Watts
Diesel engine drive:								
Electric motor drive:								

(1) Compressor speed
(2) Balance electrical power input of heaters and fans
(3) Fuel consumption
(4) Electric power consumption
(5) Condensing pressure
(6) Compressor suction
(7) Mean temperature outside calorimeter
(8) Mean temperature air inlet to evaporator
(9) Effective refrigeration capacity

Maximum error of measurement:
U coefficient of calorimeter
Effective refrigeration capacity
Pressure measurements
Evaporator air delivery volume
Fuel consumption
Compressor speed
Temperatures

b) Test method and results:

Test method (1): heat balance method/enthalpy difference method

In a calorimeter:
U-coefficient of calorimeter when fitted with the tested refrigeration unit: . . . . W/ °C,
at a mean wall temperature of . . . . . °C.

In an item of transport equipment:
K-coefficient of an item of transport equipment fitted with a refrigeration unit.....W/m^{2}°C,
at a mean wall temperature of ……° C.

Method employed for the correction of the U-coefficient of the body as a function of the mean wall temperature of the body:

(c) Checks

Temperature regulator: Setting..... Differential..... ° C

Functioning of the defrosting device (1): satisfactory/unsatisfactory

Air delivery volume leaving the evaporator at a static pressure of 0 pa
Engine driven.....m^3/hr Electric driven.....m^3/hr

Existence of a means of supplying heat to the evaporator for setting the thermostat between 0 and 12 °C (1): yes/no

(d) Remarks.....
.....

Done at:.....On:.....Testing Officer.....

_____

(1) Delete where applicable
(2) Value indicated by the manufacturer
(3) Where applicable

TEST REPORT MODEL No.6

[Expert field check of the insulation and the cooling/heating appliances of equipment in service]

The equipment was originally ATP certified based on test reports Nos.....Dated.....
issued by approved testing station (name and address).....
.....K
coefficient.....$W/m^2°C$
Manufacturer of insulated body..... Serial Number.....
Condition of insulated body when checked:
Top ..... Side walls.....
End walls..... Bottom.....
Doors and openings..... Seals.....
Cleaning drainholes..... Air tightness.....
Dimensions:..... Have dimensions changed since new.....
Remarks:.....
Cooling/heating(1) appliance. Manufacturer.....
Type.....Serial Number.....year of manufacture.....
Description.....
Refrigeration capacity stated in ATP test report above for an outside temperature of +30°C and an inside temperature of: 0°C.....;-10°C.....;-20°C.....
Refrigerant and weight of charge.....kg
Fans: Description.....
Power.....W Delivery volume.....m^3/hr
Dimensions of products:.....……
Condition of appliance when checked.....
Temperatures at beginning of test: Inside.....°C Outside.....°C
Date and time of closure of equipment's doors and openings.....
Pull-down time from beginning of test to attainment of class temperature.....h
Record of temperatures with time:

Hrs													
T_I													
T_e													

Defrost mechanism(2); correct operation: yes/no (1); correct termination: yes/no (1)
Thermostat check. At 0°C
According to the above test results the equipment may be recognized by means of a certificate in accordance with ATP annex 1, appendix 3, valid for not more than three years, with the an appropriate distinguishing mark as specified in annex 1, appendix 4
Done at……on: …….Testing Officer……

_____

(1) Delete as appropriate
(2) If applicable

Annex l, Appendix 3

[A.] **FORM OF CERTIFICATE FOR INSULATED, REFRIGERATED, MECHANICALLY REFRIGERATED OR HEATED EQUIPMENT USED FOR THE INTERNATIONAL CARRIAGE OF PERISHABLE FOODSTUFFS BY LAND**

(1) (2)

	EQUIPMENT			
INSULATED	REFRIGERATED	MECHANICALLY REFRIGERATED	HEATED	(3)

CERTIFICATE (4)

issued pursuant to the Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for such Carriage (ATP)

l. Issuing authority
2. Equipment (5)
3. Identification number ……. allotted by
4. Owner or operated by
5. Submitted by
6. Is approved as (6)
   6.l. with one or more thermal appliances which (is) (are):
      6.l.l. independent;)
      6.l.2. not independent;)
      6.l.3. removable;) (3)
      6.l.4. not removable.)

7. Basis of issue of certificate
   7.l. This certificate is issued on the basis of:
      7.l.l. tests of the equipment;)
      7.l.2. conformity with a reference item of equipment;)
      7.l.3. a periodic inspection;) (3)
      7.l.4. transitional provisions.)

7.2. If the certificate is issued on the basis of a test or by reference to an item of equipment of the same type which has been tested, specify:

7.2.l. the testing station.....
7.2.2. the nature of the tests (7) .....
.....
7.2.3. the number(s) of the report(s).....
7.2.4. the K coefficient .....

7.2.5. the effective refrigerating capacity [8]
at an outside temperature of 30 °C
and an inside temperature of ..... ° C .....W
" " " ..... ° C .....W
" " " ..... ° C.....W

8. This certificate is valid until .....

8.l. provided that:

8.l.l. the insulated body (and, where applicable, the thermal appliance) is maintained in good condition;

8.l.2. no material alteration is made to the thermal appliances; and

8.l.3. if the thermal appliance is replaced, it is replaced by an appliance of equal or greater refrigerating capacity.

9. Done at:.....

10. on:.....

(The competent authority)

---

(1) Distinguishing sign of the country, as used in international road traffic.

(2) The number (figures, letters, etc) indicating the authority issuing the certificate and the approval reference.

(3) Strike out/remove what does not apply

(4) The blank certificate shall be printed in the language of the issuing country and in English, French or Russian; the various items shall be numbered as in the above model.

(5) State type (wagon, lorry, trailer, semi-trailer, container, swap body etc.); in the case of tank equipment for the carriage of liquid foodstuffs, add the word “tank”.

(6) Enter here one or more of the descriptions listed in appendix 4 of this annex, together with the corresponding distinguishing mark or marks.

(7) For example: Measurement of K coefficient or efficiency of cooling or heating appliances

(8) Where measured in conformity with the provisions of appendix 2, paragraphs [**3.1.5 et 3.1.6**] to this annex.

B. CERTIFICATION PLATE OF COMPLIANCE OF THE EQUIPMENT, AS PROVIDED FOR IN ANNEX 1, APPENDIX 1, [PARAGRAPH 3]

l. The certification plate shall be affixed to the equipment permanently and located in a clearly visible place which is adjacent to any other approval plate issued for official purposes. [**The size of the plate**] shall be at least 160 mm by 100 mm. The following particulars shall be indicated legibly and indelibly in at least the English or French or Russian language:

(a) the Latin letters "ATP" followed by the words "APPROVED FOR TRANSPORT OF PERISHABLE FOODSTUFFS",

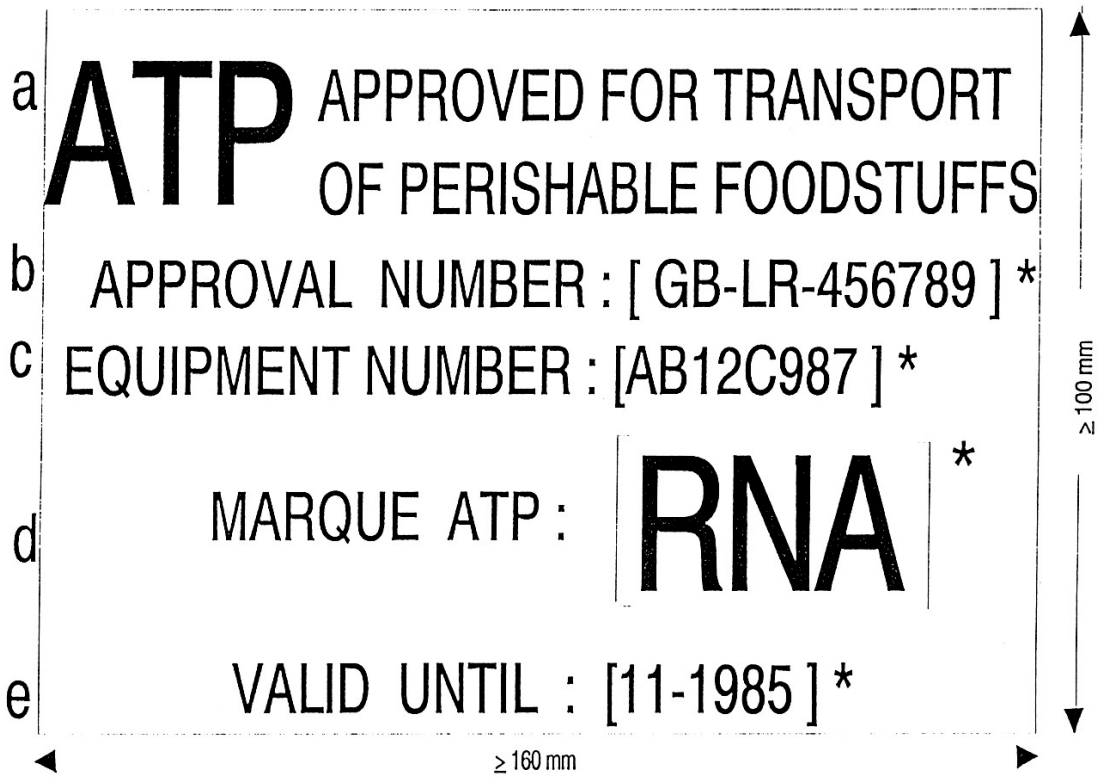
(b) "APPROVAL NUMBER" followed by the distinguishing sign (in international road traffic) of the State in which the approval was granted and the number (figures, letters, etc.) of the approval reference,

(c) "EQUIPMENT NUMBER" followed by the individual number assigned to identify the particular item of equipment (which may be the manufacturer's number),

(d) "ATP MARK" followed by the distinguishing mark prescribed in annex l, appendix 4, corresponding to the class and the category of the equipment,

(e) "VALID UNTIL" followed by the date (month and year) when the approval of the unit of equipment expires. If the approval is renewed following a test or inspection, the subsequent date of expiry may be added on the same line.

2. The letters "ATP" and the letters of the distinguishing mark should be approximately 20 mm high. Other letters and figures should not be less than 5 mm high.



* The particulars in square brackets are given by way of example

Annex l, Appendix 4

DISTINGUISHING MARKS TO BE AFFIXED TO SPECIAL EQUIPMENT

The distinguishing marks prescribed in appendix l, paragraph 4 to this annex shall consist of capital Latin letters in dark blue on a white ground; the height of the letters shall be at least 100 mm. The marks shall be as follows:

Equipment	**Distinguishing mark**
Normally insulated equipment	IN
Heavily insulated equipment	IR
Class A refrigerated equipment with normal insulation	RNA
Class A refrigerated equipment with heavy insulation	RRA
Class B refrigerated equipment with heavy insulation	RRB
Class C refrigerated equipment with heavy insulation	RRC
Class D refrigerated equipment with normal insulation	RND
Class D refrigerated equipment with heavy insulation	RRD
Class A mechanically refrigerated equipment with normal insulation	FNA
Class A mechanically refrigerated equipment with heavy insulation	FRA
Class B mechanically refrigerated equipment with heavy insulation	FRB
Class C mechanically refrigerated equipment with heavy insulation	FRC
Class D mechanically refrigerated equipment with normal insulation	FND
Class D mechanically refrigerated equipment with heavy insulation	FRD
Class E mechanically refrigerated equipment with heavy insulation	FRE
Class F mechanically refrigerated equipment with heavy insulation	FRF
Class A heated equipment with normal insulation	CNA
Class A heated equipment with heavy insulation	CRA
Class B heated equipment with heavy insulation	CRB

If the equipment is fitted with removable or non-independent thermal appliances, the distinguishing mark or marks shall be supplemented by the letter X.

The date (month, year) entered under section A, item 8 in appendix 3 of this annex as the date of expiry of the certificate issued in respect of the equipment shall be quoted under the distinguishing mark or marks aforesaid.

Model:

5 = month (May)) of expiry of the
2005 = year) certificate

_____