



BSI Standards Publication

Insulated means of transport for temperature sensitive goods — Requirements and testing

Part 2: Equipment

National foreword

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The UK participation in its preparation was entrusted to Technical Committee TW/1, Freight containers and swap bodies.

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Published by BSI Standards Limited 2025

ISBN 978 0 539 28441 6

ICS 27.200; 55.180.10

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2025.

Amendments/corrigenda issued since publication

Date	Text affected
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English Version

Insulated means of transport for temperature sensitive goods - Requirements and testing - Part 2: Equipment

Moyens de transport isothermes pour les
marchandises sensibles à la température - Exigences et
essais - Partie 2: Equipement

Wärmegeämmte Transportmittel für
temperaturempfindliche Produkte - Anforderungen
und Prüfung - Teil 2: Einrichtungen

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European foreword

This document (EN 17066-2:2025) has been prepared by Technical Committee CEN/TC 413 “Insulated means of transport for temperature sensitive goods with or without cooling and/or heating device”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2026, and conflicting national standards shall be withdrawn at the latest by April 2026.

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1 Scope

This document is applicable to thermally insulated means of transport used for temperature sensitive goods equipped with a cooling and/or heating device.

This document is applicable to the terminology, the requirements for thermal insulation, air tightness, dimensioning of equipment with cooling and/or heating device for long distance and distribution transport.

This document does not apply to further land transport requirements with regard to dimensions, weights, etc. Further this document does not apply to safety requirements or special requirements for thermal containers covered by ISO 1496-2.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12830, *Temperature recorders for the transport, storage and distribution of temperature sensitive goods — Tests, performance, suitability*

EN 13485, *Thermometers for measuring the ambient or internal temperature for the transport, storage and distribution of temperature sensitive goods — Tests, performance, suitability*

EN 13486, *Temperature recorders and thermometers for measuring the ambient or internal temperature for the transport, storage and distribution of temperature sensitive goods — Periodic verification*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 General

3.1.1

compartment

insulated part of a container built for the carriage of the goods equipped or not with a cooling and/or heating device

3.1.2

unconditioned compartment

compartment considered to have no evaporator or other cooling and/or heating devices or for which they are inactive

3.1.3

distribution transport

tour including at least 2 locations of delivery and/or collection of goods

3.1.4**long-distance transport**

uninterrupted transport of goods from a collection point to a delivery point without intermediate loading and unloading

3.1.5**eutectic elements**

elements (e.g. plates, tubes, etc.) intended for cold or heat charging, containing an inside eutectic solution having the characteristic to change phase at a specific temperature

Note 1 to entry: Fixed eutectic elements are cooled or heated with a cooling and/or heating device.

Note 2 to entry: Movable eutectic elements are cooled or heated in a temperature-controlled space at a temperature sufficient to achieve the phase change.

3.1.6**goods**

temperature sensitive products to be transported within a defined temperature range

3.2 Equipment**3.2.1****equipment**

container equipped with a cooling and/or heating device in one or more compartments

3.2.2**multi-temperature equipment**

container divided by insulated partition walls in two or more compartments and equipped with a cooling and/or heating device for maintaining different temperatures

3.2.3**non-mechanically refrigerated equipment**

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 cooling device is capable of lowering the inside temperature at a nominal outside temperature of a compartment, and thereafter maintaining it, at the required inside temperature

Note 1 to entry: Some nominal outside and inside temperature are proposed in in Annex B.

3.2.4**mechanically refrigerated equipment**

equipment either fitted with a cooling device, or served jointly with other units of transport equipment by such an appliance, (fitted with either a mechanical compressor, or an absorption cooling device etc.) which is capable of lowering the inside temperature at a nominal outside temperature of a compartment, and thereafter maintaining it, at the required inside temperature

3.2.5**heated equipment**

equipment fitted with a heating device, which is capable of raising the inside temperature of a compartment to, and thereafter maintaining it at a positive minimum temperature, with a nominal outside temperature

Note 1 to entry: Inside and outside temperatures are indicated in Annex B, Table B.1.

3.2.6

cooling device

system which lowers and/or maintains temperature in a compartment

3.2.7

heating device

system which increases and/or maintains temperature in a compartment

3.2.8

start/stop operation

automatic and usually electronic process which stops the thermal engine of the refrigeration system when one temperature limit is reached and starts when the other one is exceeded

Note 1 to entry: In this mode besides the controller the refrigeration compressor, fans of the condenser and evaporator are stopped.

3.2.9

mean surface area

S_m

geometrical mean of the projected internal surface area S_i and the projected external surface area S_e in m^2

$$S_m = \sqrt{S_i \cdot S_e} \quad (1)$$

Note 1 to entry: See EN 17066-1.

3.3 Testing

3.3.1

cooling down

heating up

process by which the mean internal temperature of the equipment, including the internal surface layer and half of the insulation thickness, is cooled down or heated up to the specified temperature

3.3.2

conditioned room

room where the test conditions can be maintained at a constant level

4 Requirements for equipment

4.1 General (user instructions and limits)

Instructions for use shall be prepared and supplied by the manufacturer of the container and by the manufacturer of the cooling and/or heating device which may be mechanically refrigerated equipment or non-mechanically refrigerated equipment.

In order to prevent the goods temperature from exceeding the permitted limit values, the load space and goods shall be brought to the required temperature prior to loading. Depending on goods and temperature limits, modulation of the air circulation including start/stop operation is possible.

The dimensioning of the cooling and/or heating devices for transport equipment in accordance with this document intends to maintain the goods concerned during transport at the required temperature. This shall compensate for heat transfer including door openings for multiple loading and unloading.

For certain goods the required minimum and maximum limiting temperature has to be considered.

To minimize energy consumption the air leakage rate should be considered taking into account the recommendations in the informative Annex C.

4.2 Non-mechanically refrigerated and/or heated equipment

For non-mechanically refrigerated and/or heated equipment, except those built for small containers, including one or more compartments, the cooling and/or heating device should be filled and/or charged without affecting the temperature of the goods.

4.3 Internal air circulation

4.3.1 General

The following requirement does not apply to natural convection cooling or heating devices.

In order to ensure proper air distribution, equipment with forced ventilation requires defined air circulation. The design air flow V_a should be selected in consideration to the required temperature and product type as indicated in the informative Annex D.

Heated cargo may require alternative air flow and/or air distribution system to ensure warm air is forced uniformly throughout the load space.

Start/stop operation of the unit when the evaporator fans are not in use is less critical for goods transported at temperatures lower than $-18\text{ }^{\circ}\text{C}$.

Start/stop operation is not recommended under any of the following circumstances:

- sensitive chilled goods (flowers, cheese, ...);
- high temperature difference between ambient and goods;
- low temperature tolerance of goods;
- low mass and/or low specific heat capacity of the goods;
- distribution transport with multiple door openings.

Under these circumstances the air flow has to be maintained. During cooling down or heating up a continuous air flow is recommended.

As indicated in Annex D the air flow rate can be modulated if the indicated temperature range has been reached except for certain sensitive goods.

The delivered air pressure of the forced ventilation shall be designed so that the additional pressure loss to be expected due to loading, any internal equipment (e.g. air duct) and evaporator should be compensated for.

4.3.2 Air handling and distribution

4.3.2.1 General

A container with a cooling and/or heating device shall provide air circulation around the goods, a minimum air flow and shall avoid air short cycling and hot spots with additional accessories:

4.3.2.2 Air supply

The air supply, roof mounted or roof/floor incorporated, shall ensure the air distribution to reach all parts of the container. A minimum air velocity of $1,0\text{ m/s}$ at a distance no more than 10 % of internal length measured from the rear end of the container (compartment) and not less than 80 % of the internal height shall be provided.