INTERNATIONAL STANDARD

ISO 1496-2

Sixth edition
2018-11

Series 1 freight containers — Specification and testing —

Part 2: Thermal containers

Conteneurs de la série 1 — Spécifications et essais —

Partie 2: Conteneurs à caractéristiques thermiques

Reference number
ISO 1496-2:2018(E)

© ISO 2018



COPYRIGHT PROTECTED DOCUMENT

© ISO 2018

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Classification **3**

5 Marking **3**

6 Dimensions and ratings **4**
6.1 External dimensions 4
6.2 Internal dimensions 4
6.3 Ratings 4

7 Design requirements **5**
7.1 General 5
7.2 Corner fittings 6
7.3 Base structure 6
7.4 End structure 7
7.5 Side wall structure 7
7.6 Walls 7
7.7 Door opening 7
7.8 Sanitary and taint-free requirements 7
7.9 Requirements for optional features 8
7.9.1 Fork-lift pockets 8
7.9.2 Gooseneck tunnels 8
7.9.3 Drains 8
7.9.4 Water connections 8
7.9.5 Picture frames 8
7.9.6 Modified/controlled atmospheres 8
7.9.7 Fresh air ventilation control 9
7.9.8 Humidity control 9
7.9.9 Load line 9
7.9.10 Floor 9
7.9.11 Air circulation 9

8 Testing **9**
8.1 General 9
8.2 Test No. 13 — Airtightness test 11
8.2.1 General 11
8.2.2 Procedure 11
8.2.3 Requirements 11
8.3 Test No. 14 — Heat leakage test 11
8.3.1 General 11
8.3.2 Procedure 12
8.3.3 Heat leakage calculation 14
8.3.4 Requirements 14
8.4 Test No. 15 a) — Test of the performance of a thermal container under refrigeration by a mechanical refrigeration unit (MRU) 14
8.4.1 General 14
8.4.2 Test conditions 15
8.4.3 Test procedure 15
8.4.4 Requirements 15
8.5 Test No. 15 b) — Functional test of a thermal container at high ambient temperatures while being cooled by a mechanical refrigeration unit (MRU) 16
8.5.1 General 16

© ISO 2018 – All rights reserved

8.5.2 The thermal container shall be equipped with instruments for the measurement of: 16
8.5.3 Test conditions 16
8.5.4 Test procedure 16
8.5.5 Requirements 17
8.6 Test No. 15 c) — Energy consumption of a thermal container at defined ambient temperatures while being cooled by a mechanical refrigeration unit (MRU) 17
8.6.1 General 17
8.6.2 The thermal container shall be equipped with instruments for the measurement of: 17
8.6.3 Test conditions 17
8.6.4 Test procedure 18
8.6.5 Requirements 18
8.7 Test No. 16 — Strength of mounting devices for removable equipment (where fitted) 18
8.7.1 General 18
8.7.2 Test No. 16 a) — Vertical loading 18
8.7.3 Test No. 16 b) — Horizontal loading 19
9 Electrical aspects of thermal containers 19
9.1 General 19
9.2 General requirements for standard voltage equipment 20
9.3 Remote condition monitoring 21
Annex A (normative) **Requirements for cooling water connections 22**
Annex B (informative) **Picture frames 25**
Annex C (normative) **Air temperature measurement points 27**
Annex D (normative) **Phase connections to container plugs and sockets 30**
Annex E (normative) **Electric plug and socket, four-pin, 380/440 V, 50/60 Hz, 32 A 32**
Annex F (informative) **Electrical power supplies for thermal containers (9.2) 36**
Annex G (normative) **General requirements for 220 V and dual voltage equipment 37**
Annex H (informative) **MRU Nose Mounted Frame (Optional Backup Generator Set) 38**
Annex I (informative) **Ageing of polyurethane foam 39**
Bibliography 45

 © ISO 2018 – All rights reserved

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 104, *Freight containers*, SC 2, *Specific purpose containers*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This sixth edition cancels and replaces the fifth edition (ISO 1496-2:2008) which has been technically revised. The main changes compared to the previous edition are as follows:

— an easy reference for containers dimensions has been included in Table 1;

— the –18 °C/+38 °C cooling capacity test has been reinstated;

— the 50 °C ambient functionality test has been added;

— energy consumption tests have been added;

— an airflow requirement has been added;

— integrated front containers has been added;

— a clip on MRU units has been removed;

— a floor height and load line requirement has been added;

— design temperatures have been changed to reflect modern MRU's;

— tests described in ISO 1496-1 have been removed and referenced;

— new Annexes H and I have been added;

— the old annex D has been removed and referenced to ISO 668;

— the test procedure for heat leakage has been revised;

© ISO 2018 – All rights reserved

— the heat-leakage rate for 1CCC has been included in Table 2.

A list of all parts in the ISO 1496 series can be found on the ISO website.

© ISO 2018 – All rights reserved

Series 1 freight containers — Specification and testing —

Part 2: Thermal containers

1 Scope

This document gives the basic specifications and testing requirements for ISO series 1 thermal containers for international exchange and for conveyance of goods by road, rail and sea, including interchange between these forms of transport.

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.

ISO 668, *Series 1 freight containers — Classification, dimensions and ratings*

ISO 1496-1, *Series 1 freight containers — Specification and testing*

ISO 1161, *Series 1 freight containers — Corner fittings — Specification*

ISO 6346, *Freight containers — Coding, identification and marking*

ISO Guide 51, *Safety aspects — Guidelines for their inclusion in standards*

IEC 60309-2, *Plugs, socket-outlets and couplers for industrial purposes — Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories*

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in ISO Guide 51, ISO 668, ISO 1161, ISO 6346, ISO 1496-1, IEC-60309-2 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
thermal container
insulated container
freight container having insulating walls, doors, floor and roof designed to delay the rate of heat transmission between the inside and the outside of the container

3.2
refrigeration container
<expendable refrigerant> thermal container served by a unit using a means of cooling such as liquefied gases, with or without evaporation control (ERU)

© ISO 2018 – All rights reserved

3.3
picture frame
opening in one end of a thermal container to accommodate an integral refrigeration unit

3.4
built-in front mechanically refrigerating and heated container
thermal container with built-in recess for a refrigeration and heating unit

3.5
heated container
thermal container with a heat producing unit

3.6
controlled atmosphere
modified atmosphere
system installed in a thermal container served by a refrigeration unit, capable of generating and/or maintaining gas concentration levels different to those of the air outside the container

3.7
removable equipment
power-generating unit or other equipment designed to be attached or detached from a thermal container

3.8
internally
<location> totally within the external dimensional envelope of the container as defined in ISO 668

3.9
externally
<location> partially or totally outside the external dimensional envelope of the container as defined in ISO 668

Note 1 to entry: It is implicit in this definition that a unit located externally needs to be removable or retractable to facilitate transport in certain modes.

3.10
batten
member protruding from the inside walls of the container to hold the cargo away from the wall to provide an air passage

Note 1 to entry: The member may be integral with the wall, fastened to the wall or added during cargo loading.

3.11
bulkhead
partition providing a plenum chamber and/or air passage for either return or supply air

Note 1 to entry: The partition may be an integral part of the unit or a separate member.

3.12
load line
mark on the interior surface of a thermal container above which cargo should not be stowed

3.13
T-floor
section of floor, usually in aluminium, in the profile of the letter “T” for supporting cargo and distributing air

© ISO 2018 – All rights reserved

3.14
fresh air vent
adjustable orifice to allow a supply of outside air into a mechanical refrigeration container

Note 1 to entry: A mechanical refrigeration container is a thermal container served by a mechanical refrigeration unit (MRU).

3.15
floor drain
self-sealing floor orifice to allow the expulsion of condensate

3.16
vacuum valve
valve to prevent the development of excessive air pressure differential between inside and outside of the thermal container

3.17
defrost drain
orifice for discharging condensate from the cooling coil

3.18
pin mounting
mounting system using two vertical pins engaging in sockets built into the front header

3.19
lower mounting point
threaded receptacle to which the lower two corners of the removable equipment are fastened

3.20
new thermal container
new insulated container
freight container having insulating walls, doors, floor and roof that has been manufactured within the previous 7 days and with maximum heat-leakage rate, U_{max}, following Table 2

3.21
high ambient temperature
temperature above 50 °C at which the MRU is expected to operate without functional restrictions

3.22
aged thermal container
thermal container with aged polyurethane foam and with a heat-leakage rate, U value, 20 % higher than the U_{max} value given in Table 2

4 Classification

The container types covered by this document are classified as shown in Table 2, in which the maximum allowable new thermal container heat-leakage rates are specified.

5 Marking

The marking of thermal containers shall be in accordance with ISO 6346. Load line marking shall be in accordance with 7.9.9. In addition, thermal containers given a modified/controlled atmosphere shall be marked in accordance with 7.9.6. Marking symbols can be found in ISO 7010. Thermal containers with fresh air ventilation control shall be marked in accordance with 7.9.7.

© ISO 2018 – All rights reserved