

---

---

**Ducted air-conditioners and air-to-air  
heat pumps — Testing and rating for  
performance**

*Climatiseurs et pompes à chaleur air/air raccordés — Essais et  
détermination des caractéristiques de performance*





**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, 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  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

# Contents

	Page
<b>Foreword</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Symbols</b> .....	<b>4</b>
<b>5 Airflow setting</b> .....	<b>7</b>
5.1 General.....	7
5.2 Indoor airflow setting.....	7
5.3 ESP for rating.....	7
5.4 Outdoor airflow.....	9
5.5 Unit supplied without indoor fan.....	9
<b>6 Cooling tests</b> .....	<b>9</b>
6.1 Cooling capacity tests.....	9
6.1.1 General conditions.....	9
6.1.2 Temperature conditions.....	10
6.1.3 Test conditions.....	11
6.2 Maximum cooling performance test.....	11
6.2.1 General conditions.....	11
6.2.2 Temperature conditions.....	11
6.2.3 Airflow conditions.....	12
6.2.4 Test conditions.....	12
6.2.5 Performance requirements.....	12
6.3 Minimum cooling performance test.....	13
6.3.1 General conditions.....	13
6.3.2 Temperature conditions.....	13
6.3.3 Airflow conditions.....	13
6.3.4 Test conditions.....	14
6.3.5 Performance requirements.....	14
6.4 Condensate control and enclosure sweat performance test.....	15
6.4.1 General conditions.....	15
6.4.2 Temperature conditions.....	15
6.4.3 Airflow conditions.....	15
6.4.4 Test conditions.....	15
6.4.5 Performance requirements.....	15
<b>7 Heating tests</b> .....	<b>16</b>
7.1 Heating capacity tests.....	16
7.1.1 General conditions.....	16
7.1.2 Temperature conditions.....	17
7.1.3 Airflow conditions.....	17
7.1.4 Defrost operation.....	18
7.1.5 Test procedure — General.....	18
7.1.6 Preconditioning period.....	19
7.1.7 Equilibrium period.....	19
7.1.8 Data collection period.....	19
7.1.9 Test procedure when a defrost cycle (whether automatically or manually initiated) ends the preconditioning period.....	20
7.1.10 Test procedure when a defrost cycle does not end the preconditioning period.....	20
7.1.11 Test procedure for transient tests.....	20
7.1.12 Heating capacity test results.....	22
7.2 Maximum heating performance test.....	22
7.2.1 General conditions.....	22
7.2.2 Temperature conditions.....	22

7.2.3	Airflow conditions.....	22
7.2.4	Test conditions.....	23
7.2.5	Performance requirements.....	23
7.3	Minimum heating performance test.....	23
7.3.1	General conditions.....	23
7.3.2	Temperature conditions.....	23
7.3.3	Airflow conditions.....	23
7.3.4	Test conditions.....	23
7.3.5	Performance requirements.....	24
7.4	Automatic defrost performance test.....	24
7.4.1	General conditions.....	24
7.4.2	Temperature conditions.....	24
7.4.3	Airflow conditions.....	24
7.4.4	Test conditions.....	24
7.4.5	Performance requirements.....	25
<b>8</b>	<b>Test methods and uncertainties of measurement.....</b>	<b>25</b>
8.1	Test methods.....	25
8.1.1	General.....	25
8.1.2	Calorimeter test method.....	25
8.1.3	Indoor air enthalpy method.....	25
8.1.4	Capacity tests.....	26
8.2	Uncertainty of measurement.....	26
8.3	Test tolerances for steady-state cooling and heating capacity tests.....	27
8.4	Test tolerances for performance tests.....	28
<b>9</b>	<b>Test results.....</b>	<b>28</b>
9.1	Capacity results.....	28
9.1.1	General.....	28
9.1.2	Adjustments.....	29
9.1.3	Cooling capacity calculations.....	29
9.1.4	Heating capacity calculations.....	29
9.2	Data to be recorded.....	30
9.3	Test report.....	33
9.3.1	General information.....	33
9.3.2	Capacity test results.....	33
9.3.3	Performance tests.....	33
<b>10</b>	<b>Marking provisions.....</b>	<b>34</b>
10.1	Nameplate requirements.....	34
10.2	Nameplate information.....	34
10.3	Split systems.....	34
<b>11</b>	<b>Publication of ratings.....</b>	<b>34</b>
11.1	Standard ratings.....	34
11.2	Other ratings.....	35
	<b>Annex A (normative) Airflow settings for ducted units.....</b>	<b>36</b>
	<b>Annex B (normative) Test requirements.....</b>	<b>41</b>
	<b>Annex C (informative) Airflow measurement.....</b>	<b>48</b>
	<b>Annex D (normative) Calorimeter test method.....</b>	<b>54</b>
	<b>Annex E (normative) Indoor air enthalpy test method.....</b>	<b>62</b>
	<b>Annex F (informative) Refrigerant enthalpy test method.....</b>	<b>68</b>
	<b>Annex G (informative) Outdoor air enthalpy test method.....</b>	<b>70</b>
	<b>Annex H (informative) Indoor calorimeter confirmative test method.....</b>	<b>73</b>
	<b>Annex I (informative) Outdoor calorimeter confirmative test method.....</b>	<b>75</b>

<b>Annex J</b> (informative) <b>Balanced-type calorimeter confirmative test method</b> .....	77
<b>Annex K</b> (informative) <b>Cooling condensate measurements</b> .....	78
<b>Annex L</b> (normative) <b>Supplemental requirements when rating fan-less (coil-only) type units</b> .....	79
<b>Annex M</b> (informative) <b>Pictorial examples of the heating capacity test procedures given in <a href="#">7.1</a></b> .....	82
<b>Bibliography</b> .....	89

## 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](http://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](http://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 on 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 the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 86, *Refrigeration and air-conditioning*, Subcommittee SC 6, *Testing and rating of air-conditioners and heat pumps*.

This third edition cancels and replaces the second edition (ISO 13253:2011), which has been technically revised.

# Ducted air-conditioners and air-to-air heat pumps — Testing and rating for performance

## 1 Scope

This document specifies performance testing, the standard conditions and the test methods for determining the capacity and efficiency ratings of air-cooled, air-conditioners and air-to-air heat pumps.

This document is applicable to the following equipment:

- ducted air-cooled air conditioners and ducted air to air heat pumps.

This document is limited to

- residential, commercial and industrial single-package, and split-system air conditioners and heat pumps,
- factory-made, electrically driven and use mechanical compression,
- utilizing single, multiple and variable capacity components, and
- multiple split-system utilizing one or more refrigeration systems, one outdoor unit and one or more indoor units, controlled by a single thermostat/controller.

The requirements of testing and rating contained in this document are based on the use of matched assemblies.

This document is not applicable to the rating and testing of the following:

- a) water-source heat pumps or water-cooled air-conditioners;
- b) multi-split-system air-conditioners and air-to-air heat pumps (see ISO 15042 for testing of such equipment);
- c) mobile (windowless) units having a condenser exhaust duct;
- d) individual assemblies not constituting a complete refrigeration system;
- e) equipment using the absorption refrigeration cycle;
- f) non-ducted equipment (see ISO 5151 for testing of such equipment);
- g) ducted air conditioners and/or ducted heat pumps, rated at less than 8 kW and intended to operate at external static pressures of less than 25 Pa, controlled by a single thermostat/controller (refer to ISO 5151).

This document does not cover the determination of seasonal efficiencies, which can be required in some countries because they provide a better indication of efficiency under actual operating conditions.

NOTE Throughout this document, the terms “equipment” and “systems” mean “air-conditioners” and/or “heat pumps”.

## 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.