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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 5222-1

Heat recovery ventilators and energy recovery ventilators — Testing and calculating methods for seasonal performance factor —

Part 1: Sensible heating recovery seasonal performance factors of heat recovery ventilators (HRVs)

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ISO/TC 86/SC 6

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2025-02-10

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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 86, *Refrigeration and air-conditioning*, Subcommittee SC 6, *Testing and rating of air-conditioners and heat pumps*.

A list of all parts in the ISO 5222 series can be found on the ISO website.

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 second edition cancels and replaces the first edition (ISO 5222-1:2023), which has been technically revised. The main changes are as follows:

- Terms and definitions are revised to correspond with Part 2 and Part 3 of the ISO 5222 series.
- Symbols are revised in accordance with ISO/IEC Directives, Part 2.
- Names of stages are revised to correspond with Part 2 and Part 3 of the ISO 5222 series.
- [6.2](#) Sensible heating coefficient of energy and [3.3](#) coefficient of energy is deleted.
- Errors in [6.2.3](#) are corrected.
- A note has been added in [6.2.5](#) for clarification.
- [Figure A.1](#) has been revised to correspond with Part 2 and Part 3 of the ISO 5222 series.

Heat recovery ventilators and energy recovery ventilators — Testing and calculating methods for seasonal performance factor —

Part 1: Sensible heating recovery seasonal performance factors of heat recovery ventilators (HRVs)

1 Scope

This document specifies the testing and calculating methods for sensible heating recovery seasonal performance factor of heat recovery ventilators (HRVs) covered by ISO 16494-1:2022.

This document also specifies the test conditions and the corresponding test procedures for determining the sensible heating recovery seasonal performance factor of HRVs and is intended for use only in marking, comparison, and certification purposes.

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 16494-1:2022, *Heat recovery ventilators and energy recovery ventilators — Method of test for performance — Part 1: Development of metrics for evaluation of energy related performance*

ISO 16494-1:2022/Amd 1:2023, *Heat recovery ventilators and energy recovery ventilators — Method of test for performance — Part 1: Development of metrics for evaluation of energy related performance*

ISO 16358-2:2013, *Air-cooled air conditioners and air-to-air heat pumps — Testing and calculating methods for seasonal performance factors — Part 2: Heating seasonal performance factor*

ISO 16358-2:2013/Cor 1:2013, *Air-cooled air conditioners and air-to-air heat pumps — Testing and calculating methods for seasonal performance factors — Part 2: Heating seasonal performance factor—Technical corrigendum 1*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16494-1:2022 and the following 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

heat recovery

<sensible heating> transfer of sensible energy from exhaust air to supply air in HRVs while heating

3.2**bypass ventilation function**

function for reducing power input of the fans while the heat energy recovered is less than the additional energy input due to overcoming the resistance of recovery heat exchanger during its operation time

Note 1 to entry: The bypass ventilation function makes the supply air and/or exhaust air go through the bypass passage with energy saving control.

3.3**gross effectiveness**

<sensible heating> measured effectiveness, not adjusted for leakage, motor heat gain, or heat transfer through the unit casing

Note 1 to entry: The sensible heating gross effectiveness of HRVs, at equal airflow, is described in ISO 16494-1:2022, 9.5.

3.4**bypass outdoor temperature**
 T_b

outdoor temperature in heating conditions, at which the power reduction to HRVs by operating in bypass mode is equal to the saving of power input to the heating system due to the heat recovered by HRVs

3.5**seasonal performance factor of sensible heating recovery**
 F_{sh}

ratio of seasonal amount of sensible heat recovered together with power value of moving air to the whole power input of HRVs, under the rating conditions and seasonal outdoor temperature bins selected from this standard

3.6**building heating balance temperature**
 T_{BHB}

outdoor air temperature at which building internal heat gain, solar radiation, and so on, equals to heat loss through the building envelope

4 Symbols and abbreviated terms

Symbol	Description	Unit
c_p	Specific heat of leaving supply air (SA)	kJ/(kg· °C)
E_{sh}	Capacity of seasonal sensible heating recovery	Wh
F_{sh}	Seasonal performance factor of sensible heating recovery	Wh/Wh
$L_{sh,t,j}$	Reference outdoor air sensible heating load at outdoor air bin temperature t_j	W
n	Number of temperature bins	-
n_j	Bin hours which the outdoor air bin temperature occurs	h
P_{diff}	Differential between Fan power without bypass and Fan power with bypass	kW
$P_{in,by,t,j}$	Power input to HRVs at outdoor air bin temperature t_j for bin temperature in H, Stage 1, for HRVs with bypass	W
$P_{in,E}$	Power input of seasonal sensible heating recovery	Wh
$P_{in,h,t,j}$	Power input to a supplementary preheater at full capacity	W
$P_{in,no,t,j}$	Power input to HRVs to operate the fans at outdoor air bin temperature t_j for all stages, for HRVs without bypass	W
$P_{in,t,j}$	Power input to ventilator at outdoor air bin temperature t_j	W
$P_{in,v,t,j}$	Ventilation power input of HRVs at outdoor air bin temperature	W
$P_{vma,t,j}$	Power value of moving air at outdoor air bin temperature t_j	J/s or W
Q_{cn}	Heating load from heat inflow of building	kW

Symbol	Description	Unit
Q_{ig}	Heating load from internal gain	kW
$Q_{m2, net}$	Net supply mass flow rate	kg/s
Q_s	Reduced heating load due to heat recovery	kW
Q_t	Total heating load of building	kW
Q_v	Ventilation air heating load without recovery	kW
Q_{vwr}	Ventilation air heating load with recovery	kW
T_b	Outdoor air temperature when HRVs operates under air bypass function	°C
T_{BHB}	Building heat balance temperature. At this temperature, Q_t will equal zero.	°C
T_F	The outdoor air bin temperature at which the frost occurs	°C
$T_{F,0}$	The temperature at which the test to determine the frost temperature can be started to reduce duration time of the test.	°C
$T_{0,h}$	Temperature defined in ISO 16494-1:2022, Table 2 as T5/T6/T7. It indicates the indoor design temperature of the building.	°C
ε_{sh}	Gross sensible heating recovery effectiveness of HRVs	%
$\phi_{sh,t,j}$	Sensible heat recovery capacity of HRVs at outdoor air bin temperature t_j	W

5 Tests

5.1 General requirements

The test conditions used, the accuracy and uncertainties of the instruments used shall conform with ISO 16494-1:2022 and those in this document.

5.2 Test conditions

For the purpose of ε_{sh} , E_{sh} and F_{sh} , there are three standard test conditions T5/T6/T7 corresponding to ISO 16494-1:2022, Table 2. HRVs shall be tested at one of the three test conditions, which shall be selected to most closely represent the outdoor temperature bin distribution in the region as described in [Annex B](#) and [Annex D](#).

Outdoor temperature bin distribution and bin hours differ from region to region. If bin hours are set to a certain value for a certain region, the integrated value of heating load and energy consumption can be determined.

[Table 1](#) shows the requirement of default values and the reference outdoor temperature bin distribution for test and calculation. In case of setting other outdoor temperature bin distribution, refer to the setting method as described in [Annex D](#).

Table 1 — Conditions of performance test (heating)

	Outdoor air temperature (°C)		Indoor air temperature (°C)		Application temperature bin type for calculation
	Dry bulb	Wet bulb	Dry bulb	Wet bulb	
T5	2	1	21	14	In Annex B or D
T6	5	3	20	15	
T7	7	6	20	12	
NOTE Allowable variation of readings is given in Table F.2 in ISO 16494-1:2022.					