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Heat exchangers - Test procedures for establishing performance of air to air heat recovery components



## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 308:2022 sisaldab Euroopa standardi EN 308:2022 ingliskeelset teksti.	This Estonian standard EVS-EN 308:2022 consists of the English text of the European standard EN 308:2022.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 30.03.2022.	Date of Availability of the European standard is 30.03.2022.
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English Version

## Heat exchangers - Test procedures for establishing performance of air to air heat recovery components

Échangeurs thermiques - Procédures d'essai pour la détermination de la performance des composants de récupération de chaleur air/air

Wärmeaustauscher - Prüfverfahren zur Bestimmung der Leistungskriterien von Luft/Luft-Wärmerückgewinnungsanlagen

This European Standard was approved by CEN on 13 September 2021.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN 308:2022) has been prepared by Technical Committee CEN/TC 110 “Heat exchangers”, 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of an identical text or by endorsement, at the latest by September 2022, and conflicting national standards shall be withdrawn at the latest by September 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 308:1997.

This edition includes the following significant technical changes with respect to EN 308:1997:

- Scope: flue gas heat recovery devices are no more included.
- In addition to laboratory tests of heat recovery components (HRC), laboratory tests for HRC fitted into air handling units and on-site tests of HRC are defined.
- Different precision classes for tests are defined.
- Leakage testing has been refined. Exhaust air transfer ratio (EATR) and outdoor air correction factor (OACF) are implemented.
- Differences of the sensible and latent efficiency can occur due to leakages and bad heat balance.
- Several terms and definitions are changed, e.g. categories of heat recovery components.
- Type A test is only on the heat exchanger and does not necessarily give a representative value when it is installed, corrections may be needed.

EN 13053 refers to EN 308 regarding the test setup and the test procedure. EN 13053 is a standard harmonized with the Commission Regulation (EU) 1253/2014 [5].

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Introduction

This document specifies methods for the performance testing of air-to-air heat recovery components (HRC) used in ventilation systems. This document does not contain any information on air handling units, ductwork and components of air distribution, which are covered by other European Standards. The document applies for laboratory and in on-site testing. Further it applies to different purposes of tests, which can be e.g. certification of products, acceptance of installed products, market surveillance or quality tests of manufacturers.

These different applications do not require the same precision of measurements results. Therefore, different precision classes are defined. Table 1 gives informative examples for the application of the different test types and precision classes. For low quality products, low quality installations and/or simplified testing, a 'not classified' precision class can occur for all test types.

**Table 1 — Examples for the application of the different test types and precision classes**

Test Type	Precision class P1 (high precision)	Precision class P2 (medium precision)	Precision class P3 (low precision)	not classified
<b>Test type A</b> HRC installed in a test casing or HRC-section Tested in laboratory	— certification or declaration of products — performance test	— test of functionality	— not intended use	— not intended use
<b>Test type B</b> HRC installed in an AHU <sup>a</sup> Tested in laboratory	— test under ideal conditions	— certification or declaration of products — performance test	— test of functionality	— not intended use
<b>Test type C</b> HRC installed in an AHU <sup>a</sup> or in duct work of an installed ventilation system Tested on-site	— not intended use, but possible under ideal conditions and laboratory-like test equipment	— test under ideal conditions in real systems — performance test	— typical test conditions in real systems	— test of functionality
<sup>a</sup> The HRC is installed in an AHU (air handling unit) by the manufacturer of the AHU.				

Customers and manufacturers are free to define the aspired precision class for testing of their products, but it will be taken into account that the available precision class depends on the test conditions, the HRC itself, the measurement equipment and the environment conditions.

This document is one of a series of European Standards dedicated to heat exchangers.

Note 1 Testing procedure of residential ventilation units, RVU's, is covered by EN 13141-7 and EN 13141-8.

Note 2 EN 13053 deals with non-residential ventilation units, NRVU's, specifically Air Handling Units (AHU's). For testing of the heat recovery, EN 13053 refers to EN 308.

## 1 Scope

This document specifies methods to be used for testing of air-to-air heat recovery components (HRC). The main purpose of the HRC is to exchange heat between exhaust air and supply air in order to save energy, which results in

- preheat or heat, and/or
- precool or cool

supply air in ventilation systems or air conditioning systems. Optionally HRC can exchange air humidity between exhaust and supply air. The HRC contains the heat exchangers and all necessary features and auxiliary devices for the exchange of sensible heat and (if available) air humidity between exhaust air and supply air. The HRC will be installed in casings or ducts. If fans are part of the test unit, the effect of the fan power on the measured values will be corrected.

This document specifies procedures and input criteria required for tests to determine the performance of a HRC at one or several test conditions, each of them with continuous and stationary air flows, air temperatures and humidities at both inlet sides. Three different test types are covered:

- Test type A, Laboratory testing of HRC installed in test casings (A1) or a HRC sections (A2);
- Test type B, Laboratory testing of HRC installed in non-residential ventilation units<sup>1</sup> in design configuration;
- Test type C, on-site (field) testing of HRC in non-residential ventilation units (C1) or a HRC sections (C2) in operation configuration.

This document is applicable to recuperators, regenerators, and HRC with intermediary heat transfer medium.

This document prescribes test methods for determining:

- 1) the temperature and humidity efficiency,
- 2) the pressure drop of exhaust air and supply air sides,
- 3) possible internal leakages; exhaust air transfer ratio (EATR) and outdoor air correction factor (OACF),
- 4) external leakages and
- 5) auxiliary energy used for the operation of the HRC.

HRC using heat pumps are not covered by this document.

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<sup>1</sup> Definition according Commission Regulation (EU) No 1253/2014 [5].

## 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 1886, *Ventilation for buildings — Air handling units — Mechanical performance*

EN 13053, *Ventilation for buildings — Air handling units — Rating and performance for units, components and sections*

JCGM 100, *Evaluation of measurement data — Guide to the expression of uncertainty in measurement*

## 3 Terms and definitions

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

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

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

### 3.1 Air categories

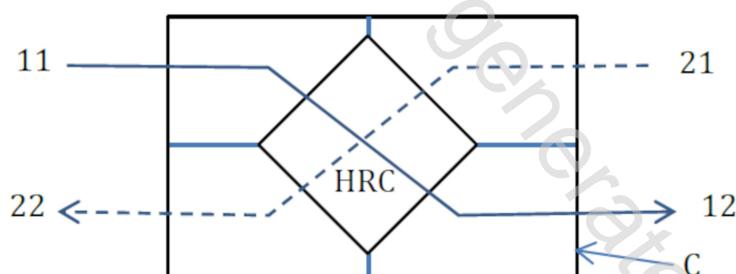
#### 3.1.1

##### exhaust air inlet

air to be exhausted from the application, before entering the HRC

Note 1 to entry: In ventilation systems, this air is usually called extract air.

Note 2 to entry: Figure 1 shows the definition of the air flow categories in heat recovery components (HRC).



#### Key

11	Exhaust air inlet	22	Supply air outlet
12	Exhaust air outlet	HRC	Heat recovery component
21	Supply air inlet	C	Casing

**Figure 1 — Air categories**

#### 3.1.2

##### exhaust air outlet

air in exhaust condition, intended to be blown back to the environment, after leaving the HRC