

LEGAL TEXT ANNEX 28

Test procedure and seasonal performance calculation for residential heat pumps with combined space and domestic hot water heating

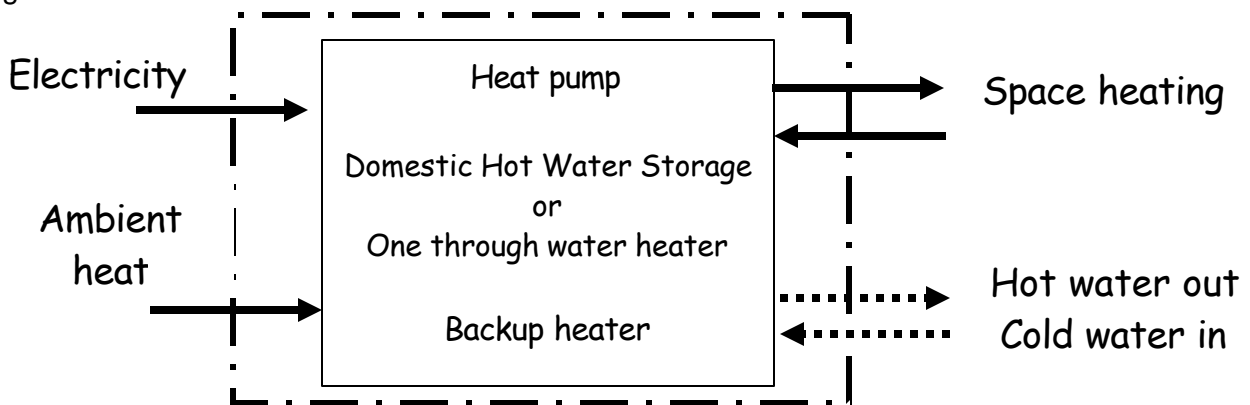
1. Description of Technical Sector; Definitions

(a) Description of Technical Sector

The share of the heat demand for the heating of domestic hot water compared to the heat demand for space heating is growing continuously. Decisive for heat pump systems with combined space heating and heating of domestic hot water is the over-all efficiency for both tasks. However the existing test procedures are restricted to the separate space heating (or cooling) and the separate heating of domestic hot water. This Annex will investigate the testing of the most common combined heat pump systems with heating of domestic hot water by

- desuperheating,
- subcooling of the condensate,
- cascade hot water heat pump,
- carrying off the heat from the supply line of the heating system.

However there is no restriction to these possibilities. The aim of the testing is to get the necessary data in order to calculate the over-all seasonal performance factor of such heat pump systems. The systems to be investigated include the heat pump, the hot water storage (or a one through water heater) and an optional supplemental backup heating as shown in the following figure:



The share of the domestic hot water consumption usually represents 10% to 50% of the total annual heating consumption.

This Annex applies to heat pumps with hydronic or air heat distribution systems and alternative or simultaneous domestic hot water production.

(b) Definitions.

- Desuperheating/Double Condenser – Cooling the working fluid from the compressor outlet temperature down to the condensation temperature.
- Subcooling of the condensate – Cooling the working fluid from the condenser outlet temperature down toward the cold water inlet temperature.

- Refrigerant Cascade hot water heat pump – Separate hot water heat pump loop with condensate subcooling as heat source.
- Domestic Hot Water Production – The water can be heated directly by the condenser or indirectly through an intermediate medium

2. Objectives and results

The two main objectives of this Annex are :

- (a) to establish a test procedure which delivers the data necessary to calculate the over-all seasonal performance factor of heat pump systems with a minimum requirement of testing equipment and testing time; and
- (b) to work out a simple method to calculate the seasonal performance factor for the heat pump systems.

Expected outcomes from the activities conducted under this Annex are to:

- a) **Establish comprehensive test procedures** for heat pump systems combining space and domestic hot water heating to be used by national and international standardisation institutions.
- b) **Produce simple methods to calculate the over-all seasonal performance factor** of heat pump systems for the alternative and simultaneous space and domestic hot water heating.
- c) **Organise a workshop** to present the results achieved and the reports produced under this Annex.

3. Means

The Participants shall co-ordinate their respective work by a national team leader to carry out the following task-sharing activities:

Task 1 - Systems to be investigated

- (a) Analyse the most common systems for combined space and domestic hot water heating.
- (b) Find out the needed parameters for the systems determined under (a) to be measured by the test procedure in order to characterise the system and calculate the over-all seasonal performance factor by an easy to use calculation method backed up by a computer simulation.
- (c) Gather the temperatures required in the different countries for domestic hot water, the daily profile of the domestic hot water consumption as described in existing standards and regulations and the impact of the interrupted electricity delivery by utilities on the heat pump operation and efficiency.
- (d) Assess the existing standards on the testing of heat pumps for the separate space and domestic hot water heating.

Task 2 - Develop a test procedure

- (e) Assess existing test procedures of heat pump systems for space and domestic hot water heating, for instance according to EN 255 (prEN 14511), ASHRAE 124 or ARI 470.
- (f) Point out the missing items in the test procedures under (e) for the combined space heating and domestic hot water heating.
- (g) Develop and provide detailed support information on a comprehensive test procedure for heat pump systems with alternative and simultaneous space and domestic hot water heating in order to get the needed parameters according to (e) and (f). The test procedure covers the storage tank, heat exchangers, circulation pumps and control.
Note: For heat pumps test procedures are already described in existing standards for space heating on one side and domestic hot water heating on the other side. Additional procedures are necessary for combined systems.

Task 3 - Develop a calculation method

- (h) Assess, develop and propose methods to calculate the over-all seasonal performance factor of heat pump systems for the combined space heating and domestic hot water heating.

4. Time Schedule

This Annex shall enter into force on 1 January 2003 and shall continue for a period of 28 months. The work schedule shall be as follows:

1 January 2003	Start of the assessment and analysis of the systems to be investigated
13/14 March 2003	Kick-off meeting
1 September 2003	Interim country reports with principal focus on Task 1 to be delivered to Operating Agent
October 2003	Second meeting - principal focus on task 1
15 February 2004	Presentation of an Annex draft report to Executive Committee.
June 2004	Third meeting – intermediate results 2 & 3
1 September 2004	Presentation of Draft country reports with principal focus on Tasks 2 and 3 to be delivered to Operating Agent
15 November 2004	Annex final draft report to be delivered to Participants
December 2004	Fourth meeting/workshop - principal focus on Tasks 2 and 3
30 April 2005	Delivery of Final Report to Executive Committee

5. Specific Obligations and Responsibilities of the Participants

- (a) Each Participant shall nominate a representative to participate in the work under this Annex.
- (b) Each Participant shall carry out the equivalent of total 4-12 person months of task-sharing work during the programme period unless otherwise agreed by the Participants.
- (c) Each Participant will conduct its own Task 1 analyses work, Task 2 test procedure and Task 3 calculation method.
- (d) Each Participant shall identify the specific system options for which it will provide analyses, test procedures and calculation methods.
- (e) Each Participant shall submit a country report covering the initial results of the Task 1 analyses.
- (f) Each Participant shall submit a final country report covering the results of the Task 2 test procedures and Task 3 calculation methods, as base for a standard proposal.
- (g) Each Participant shall contribute to the working meetings and to a workshop on the results achieved through the activities conducted under this Annex, including the identification of speakers and participants.
- (h) Additionally, each Participant shall make a direct financial contribution to the Operating Agent to cover co-ordination and report preparation expenses and other Annex related (e.g., Workshop) costs.

6. Specific Obligations and Responsibilities of the Operating Agent

The Operating Agent shall:

- (a) Develop, in co-operation with the Participants, a detailed work programme, a framework for the Final Country Report and a budget for all the activities carried out under this Annex, including methodology and time schedule;
- (b) Provide the Executive Committee with periodic reports describing the progress of the work being accomplished under the Annex;
- (c) Deliver the results as described in Section 4. More specifically, this will include surveys on the existing standards and systems as well as the needed data and the proposed test procedure for the most important systems within the framework of the Country Reports as described in paragraph 5 above;
- (d) Provide semi-annually, periodic reports to the Executive Committee on the progress and the results of the work performed;
- (e) Provide to the Executive Committee, within six months after completion of all work under the Task, a Final Report for its approval and transmittal to the Agency;
- (f) In co-ordination with the Participants, use its best efforts to avoid duplication with activities of other related programs and projects implemented by or under the auspices of the Agency or by other competent bodies;
- (g) Provide the Participants with necessary guidelines for the work they carry out, assuring minimum duplication of effort;

- (h) Co-ordinate the efforts of all Participants (and their National Teams as defined in paragraph 5 above) and ensure the flow of information within the Task;
- (i) Organise one workshop in order to review the progress and to co-ordinate the activities with the assistance of the IEA Heat Pump Centre;
- (j) Gather the country reports produced by the Participants and edit an executive summary report covering the main results of the country reports;
- (k) Provide general administration;

The IEA Heat Pump Centre will be responsible for assisting in the establishment of the Annex, in the organisation of the workshop and the publication of the proceedings, as well as of the Final Report.

7. Funding

- (a) **Working Meetings.** The working meetings shall be hosted in turn by the several Participants. The costs of organizing and hosting meetings shall be borne by the host Participant.
- (b) **Publications:** The cost of publishing the Final Report and summary assessments described in paragraph 5 above shall be equally shared by all the Participants.
- (c) **Individual Financial Obligations.** Each Participant shall bear all the costs incurring in carrying out the Task activities, including reporting and travel expenses. Additionally, each Participant shall make a direct financial contribution to the Operating Agent to cover co-ordination and report preparation expenses and other Annex-related (e.g. Workshop) costs. Table 1 shows the fees per Participant, based upon varying numbers of Participants.

Table 1 Participant fee each year for varying numbers of Participants.

No of part.	Participants' fees	
	2003	2004
5	€3 200	€3 200
6	€3 000	€3 000
7	€2 900	€2 900
8	€2 800	€2 800
9	€2 700	€2 700
10	€2 600	€2 600

Each Participant's fee shall be paid in 2 annual installments, as shown in the table 1 above.

8. Operating Agent

The Swiss Federal Office of Energy is designated as Operating Agent.

9. Information and Intellectual Property

- (a) **Executive Committee's Powers.** The publication, distribution, handling, protection and ownership of information and intellectual property arising from this Annex shall be determined by the Executive Committee, acting by unanimity, in conformity with this Annex.

(b) *Right to Publish.* The Participants shall have the right to publish information provided to or arising from their Task, except for proprietary information, as defined in paragraph (c) below.

(c) *Proprietary Information.* For the purposes of this Annex, proprietary information shall mean information of a confidential nature such as trade secrets and know-how (for example, computer programmes, design procedures and techniques, chemical compositions of materials, or manufacturing methods, processes or treatments) which is appropriately marked provided that such information:

(1) Is not generally known or publicly available from other sources;

(2) Has not previously been made available by its owner(s) to others without obligation concerning its confidentiality; and

(3) Is not already in the possession of the recipient Participant(s) without obligation concerning its confidentiality.

It shall be the responsibility of each Participant supplying proprietary information, and of the Operating Agent, to identify such information as proprietary and to ensure that it is appropriately marked.

The Participants and the Operating Agent shall take all necessary measures in accordance with this paragraph, the laws of their respective countries and international law to protect the proprietary information provided to or arising from this Task.

(d) *Production of Relevant Information by Governments.* The Operating Agent should encourage the governments of all Agency Participating Countries to make available or identify to the Operating Agent all published or otherwise freely available information known to them that is relevant to the Task.

(e) *Production of Relevant Information by Participants.* Each participant agrees to provide to the Operating Agent all previously existing information, and information developed independently of the Task, which can assist or is needed by the Operating Agent to carry out its functions in this Task, which is freely at the disposal of the Participants, and the transmission of which is not subject to any contractual and/or legal limitations, under the following conditions:

(1) The Participant will make such information available, at its own costs, provided that such costs are not substantial;

(2) If substantial costs are necessary for the Participant to make such information available, the Operating Agent and all Participants will determine the charge of the costs for each participant, upon approval of the Executive Committee.

(f) *Use of Confidential Information.* If a Participant has access to confidential information which would be useful to the Operating Agent in carrying out the studies, assessments, analysis or evaluations described in this Annex, such information may be communicated to the Operating Agent but shall not become part of any report or other form of documentation issued as part of this Task, nor shall it be communicated to the other Participants, except as may be agreed between the Operating Agent and the Participant who supplies such information. This information has to be marked clearly as "confidential".

- (g) *Acquisition of Information for the Task.* Each Participant shall inform the Operating Agent of the existence of information that can be of value to the Task, but which is not freely available, and each Participant shall endeavour to make such information available to the Task under reasonable conditions, in which event the Executive Committee may, acting unanimity, decide to acquire each information.
- (h) *Reports on Work Performed under the Task.* The Operating Agent shall prepare reports on all work performed under the Task and the result thereof, including studies, assessments, analysis, evaluations and other documentation, but excluding proprietary information, in accordance with paragraph 9(c) above.
- (i) *Copyright.* The Operating Agent, or each Participant for its own results, may take appropriate measures necessary to protect copyrightable material generated under this Task. Copyright obtained shall be the property of the Operating Agent, for the benefit of the Participants provided, however, that Participants may reproduce and distribute such material, but shall not publish it with a view to profit, except as otherwise provided by the Executive Committee.

The Contracting Parties understand and agree that the name, acronym and emblem of the IEA has been notified to the World Intellectual Property Organisation (WIPO) Secretariat according to Article 6 of the Paris Convention for the Protection of Industrial Property, as amended on 28 September 1979. The Contracting Parties further understand and agree that the OECD/IEA shall retain the copyright to all IEA deliverables, materials or publications published or to be published by the IEA or jointly by the IEA and a third party to this Annex. Should the Contracting Parties use any such deliverables, materials or publications they shall give full acknowledgement to the OECD/IEA as being the source of the material with a copyright notice in the following form: © OECD/IEA, (year of publication).

- (j) *Authors.* Each Participant shall, without prejudice to any rights of authors under its national laws, take necessary steps to provide the co-operation from its authors required to carry out the provisions in this paragraph. Each Participant shall assume the responsibility to pay awards or compensation required to be paid to its employees according to the laws of its country.

10. Participants in this Task

The Contracting Parties which are Participants in this Task are :

The Republic of Austria
 The National Research Council, Canada
 ADEME/DIAE, for the Government of France
 The Government of Japan
 The Research Council of Norway
 The Swiss Federal Office of Energy (Operating Agent)
 The United States Department of Energy.
 The UK Department of the Environment, Food and Rural Affairs
 The Swedish National Energy Administration
 The Federal Ministry of Economics and Labour Federal Republic of Germany