

**Author:**

Carsten Wemhöner (FHBB), operating agent  
University of Applied Sciences Basel  
Institute of Energy  
CH-4132 Muttenz, Switzerland  
Tel: +41-61-467-4573  
Fax: +41-61-467-4543  
[c.wemhoener@fhbb.ch](mailto:c.wemhoener@fhbb.ch)

15/04/03

**Annex 28**

**«Test procedure and seasonal performance calculation of residential heat pumps with combined space and domestic hot water production»**

**Participants**

Austria (Arsenal research), Canada (LTE Hydro Quebec), France (EdF, CETIAT), Germany (TU Dresden, Viessmann Werke GmbH), Japan (University of Tokyo), Norway (SINTEF), Switzerland (FHBB), Sweden (SP), UK (Kensaengineering), USA (DOE)

**Objectives**

The objective of this Annex 28 is to work out a test procedure and a calculation method for combined operating heat pumps for space heating and hot water production on the basis of existing standards as proposal for international standardisation committees. The test procedure is to deliver the required input data for a seasonal performance calculation. The standardisation of combined operating systems and the performance calculation shall reveal the energy saving potential of these systems, facilitate the comparability to other heating systems on the market and improve the competitiveness of combined systems.

The working programme of Annex 28 is structured in three tasks:

1. 1/03-10/03: Task 1 is a survey of existing standards and the systems on the market to determine the systems to be investigated and the system boundary for the test procedure and the performance calculation.
2. 11/03-4/05: Task 2 is the development of a test procedure for combined operating systems with regard to the input data requirements of the calculation method.
3. 11/03-4/05: Task 3 is the development of an easy-to-use hand calculation method for the seasonal performance factor of combined operating systems.

Task 2 and Task 3 will be worked out in parallel, since there is an interdependence between the test procedure and the calculation method. Two international working groups will be established, one for the test procedure and the other for the calculation method.

**Results of the Kick-off meeting**

At the kick-off meeting which took place the 13./14. of March in Muttenz, Switzerland, principal definitions of the scope of the Annex, systems to be investigated, systems boundaries, requirements and concepts for the test and calculation procedure has been discussed. The participants of Annex 28 presented their working areas, their interests and objectives and the focus for their research projects within the framework of Annex 28. A final definition will be carried out at the next working meeting in October as result of Task 1 (survey of existing standards and systems).

Austria: focus testing and calculation

Direct expansion systems with desuperheating in the storage – testing, field measurements and calculation.

Canada: focus testing

Field test for monofluid heat pumps with desuperheater for domestic hot water (DHW) as well as test rig measurements for ground source heat pumps with space heating, DHW and cooling.

France: focus testing

Test rig measurements of alternative operating A/W heat pump with CO<sub>2</sub> as working fluid and field measurements of A/W and B/W heat pumps.

Germany: focus testing and calculation

TU Dresden:

Test rig measurements of A/W heat pump and field measurements with B/W heat pump equipped with desuperheating and condensate subcooling.

Viessman GmbH:

Calculation method for unitary systems for passive houses using exhaust air.

Japan: focus testing

Test rig measurements for alternative and combined systems with CO<sub>2</sub> as working fluid, eventually inverter driven heat pumps.

Norway: focus testing

Test rig measurements of heat pump with hydrocarbon as working fluid at combined operation, field test for CO<sub>2</sub>/R407C systems, development of an adequate test procedure

Switzerland: focus calculation

Test procedure and calculation method for small scale systems for alternative and combined operating systems

Investigation of large scale systems with desuperheating and condensate subcooling

Sweden: focus testing

Test rig measurement and calculation method for exhaust air systems.

UK: focus testing and calculation

Test rig measurement for combined DHW and cooling heat pumps with desuperheating, twin condenser, calculation method for W/W and B/W heat pumps with combined DHW and cooling.

USA

The USA has not attended the kick-off meeting. According to information of Mr Ryan, the USA is in the state of project development to join the Annex.

### **Organisational issues**

The following decision concerning organisational items has been made at the kick-off meeting

Legal text

The legal text has been agreed upon by the participants and has been sent to the IEA Secretary via the IEA Heat Pump Centre.

### Funding of Operating Agent

Due to the increasing number of participants, the funding table has been extended with decreasing fees for increasing number. Bills for the first annual rate 2003 will be sent by end of May.

Because of political problems Austria cannot pay the fee and offers to create, host and maintain the official Annex Website instead. This solution is unanimously accepted by the other participants. A preliminary layout will be presented by Mr Huber.

### National team leaders

The contact persons for the national contributions to the Annex are defined as following:

Austria	Huber, Arsenal Research
Canada	Minea, LTE Hydro Quebec
France	Hantz, CETIAT
Germany	Müller, TU Dresden
Japan	Hihara, University of Tokyo
Norway	to be decided, ad interim Jakobsen
Sweden	Axéll
Switzerland	Afjei
UK	Freeborn, Kensaengineering
USA	to be decided, ad interim J. Ryan

### Status of contracts:

The national team leaders will care for the progress of the administrative procedure for the official participation in Annex 28. For the administrative procedure, a model letter has to be sent to the IEA Secretary Office. Up to now the letters of Canada, Norway and the UK have arrived at the IEA.

### Meetings

Next working meeting will be held at CETIAT in Lyon at 16./17. October 2003 with a focus on the final results on Task 1 and a discussion of first results and preparatory work for Task 2 and Task 3.