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Certification of Compact Heat Pump Units

1. Requirements (summary)

Certificate criteria for the energy and acoustic assessment of compact heat pump units for certification as “Certified Passive House Components”

Based on the German text (February 2007)

with slight adaptations February 2012

1 Criteria validity and application

The following criteria describe the limit values, conditions and requirements for the certification of compact heat pump units with small electrical heat pumps for the combined provision of space heating, domestic hot water and ventilation. Verification is based on measurements and tests in accordance with the respective current testing regulations.

2 Criteria and requirements

1. Comfort criterion

   The supply air temperature must be at least 16.5°C even when no space heating is required (ventilation only). This temperature must be achieved even at an external air temperature of –10°C.

2. Efficiency criterion – heat – for passive heat recovery

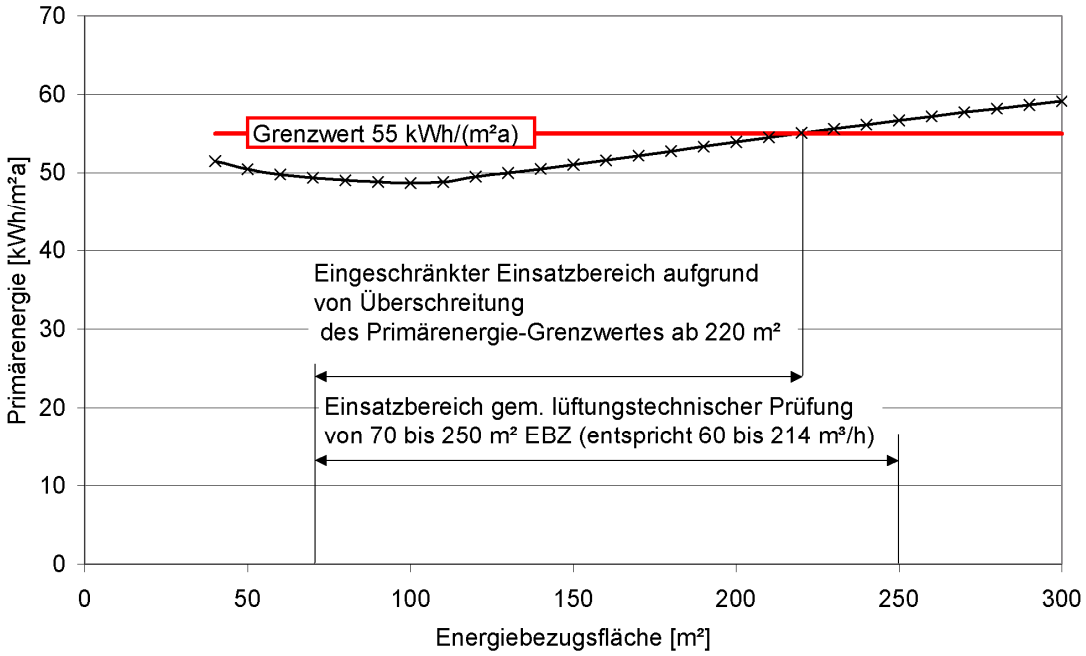
   The effective heat recovery rate must be at least 75%, based on the dry heat recovery rate and with balanced mass flows of outdoor air/exhaust air.

3. Efficiency criterion electricity
   An electrical efficiency of 0.45 Wh/m^3 must be reached for pure ventilation operation under the testing conditions according to the testing regulations.

4. Airtightness:
   The leakage air flow rates may not exceed 3% of the average air flow rate of the compact heat pump unit's air flow range.

5. Efficiency of the heat pump in the operating mode for space heating and domestic hot water:

The key characteristics (COP-values and performance data for space heating, hot water generation and standby operation, heat losses from the tank, hot water / heating precedence) are determined for the domestic hot water, space heating and standby operating modes at all test points specified in the testing regulations and stated in the certificate. They form the basis for the calculation of the primary energy balance in the PHPP (2007 version or later). The limit value for efficiency is a **primary energy demand of 55 kWh per square metre of treated floor area** for space heating, hot water, ventilation and auxiliary electricity. Verification (PHPP, standard climate data, living space of 35 m^2 per resident) is based on Passive Houses with a heating load of 12 W/m^2, a heating demand of 15 kWh/(m^{2}a) and a specific heat demand of 18 kWh/(m^{2}a) for the domestic hot water system. If the compact heat pump unit exceeds the maximum permissible primary energy value of 55 kWh/(m^{2}a) at certain air flow rates, the operating range is reduced accordingly (example given in illustration below).



y axis: primary energy x axis: Treated Floor Area (m²)
Limit value: 55 kWh/(m²a) (Primary Energy)
Description of Example:
Restricted operating range due to the primary energy limit value being exceeded at TFAs larger than 220 m²
Operating range from 70 to 250 m2 TFA, in accordance with the tested air flow range (corresponds to 60-214 m³/h)

Explanation of graph: Primary energy demand of a reference building (Passive House) with a heat pump system installed for heating and hot water generation (example). The range of operation (m³/h or m² TFA) is limited by the value at which the primary energy demand of the reference building exceeds 55 kWh/m²a.
The conversion factor between treated floor area (TFA) and air flow rate is
30 m^3/(h person) / 35 m^2/person = 0.857 m^3/(hm^2).

6. Noise protection
   In comparison with pure ventilation units, compact heat pump units generally have a high sound output, especially in the low frequency range (under 100 Hz). It is therefore necessary to declare the complete sound emission frequency spectrum of the unit's housing. It must be possible to comply with the reference values according to DIN 45680 using an installation room with solid walls (110 mm sand-lime bricks or any acoustic equivalent).

7. Requirements for the following points are identical with those for pure ventilation units
   - Adjustment and regulation
   - Room air hygiene/filter
   - Frost protection
   - Standby electricity consumption