Proving Sustainability.
Energy Demand and Economic Efficiency.

Base your purchase decision on hard facts, on economic and ecological aspects. The “TrueBlue” efficiency certificate makes costs and ecological relevance transparent and assessable.

robatherm
the air handling company

Global Climate Protection

Global climate protection goals must be implemented to be binding. The international community agrees on this point.

In the light of the depletion of fossil fuels, rising energy rates, and increasing global warming, an interdisciplinary and future-oriented approach becomes indispensable. Economic as well as ecological aspects have to be taken into account.

The call for CO_2 reduction supports the breakthrough of sustainable and energy-efficient construction.

In view of this development, the responsible handling of resources is an integral part of modern planning approaches. This is also what the various legal provisions, both national and international, aim at.

These regulations set the standards for the energetic quality of existing and new residential and non-residential buildings.

TrueBlue for True Sustainability

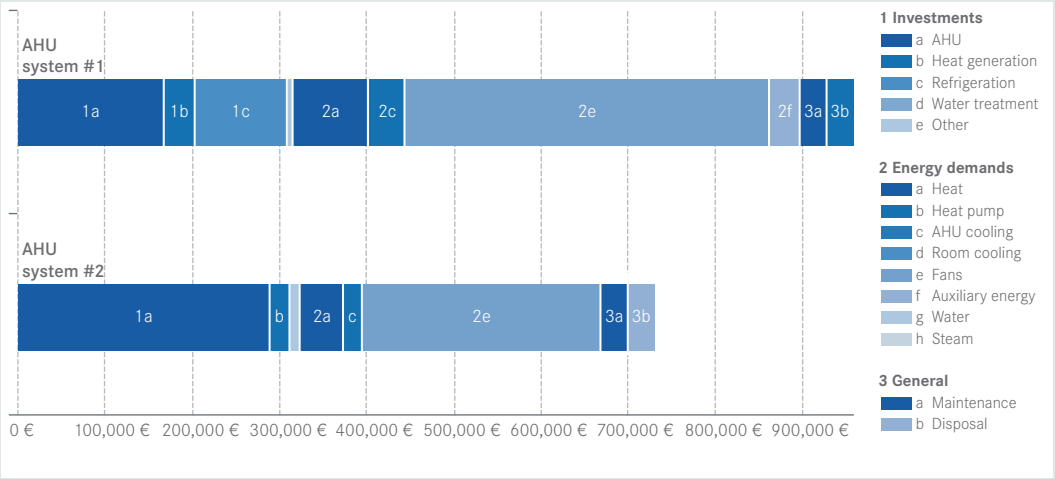
With the “TrueBlue” efficiency certificate, robatherm has launched a sustainability initiative. To our mind, energy demand, economic efficiency, and environmental compatibility are linked inseparably. Costs and characteristics are declared in this efficiency certificate in a transparent and assessable manner, allowing you to base your purchase decisions on precise economic and ecological aspects.

Making purchase decisions for an AHU concept on the mere basis of investment costs is out of date. A comprehensive cost analysis, related to the unit's life span is necessary. For every capital good gives rise to not only acquisition costs but also consequential costs. Potential savings are decision-relevant on a sustained basis, far beyond the mostly short amortization periods.

Sustainable and transparent
In the context of the TrueBlue efficiency certificate, any and all costs relevant to investors and operators are determined. Thus, the change toward increased ecological awareness, which also catches on in the real estate industry is accounted for.

Reliable results
It is imperative for an efficiency certificate to determine the optimum in energetic as well as economic terms. Depending on the specific application, investment costs and costs of operation, maintenance, and disposal are shown. In addition to the operating time of the system, our calculation takes into account the weather data of the actual installation site. Only thus can the system assessment yield reliable results. The TrueBlue efficiency certificate provides a comparison and assessment of various concepts. All characteristics required by current legislation are included, making terms such as primary energy demand and CO_2 emission tangible. Hence, we enable you to make a sound decision.

TrueBlue comparison of systems – Total LCC (VDI 2067-1)



AHU system #1:
AHU with heat recovery = 57 %, heater, chiller, central heat generation, central refrigeration (water chiller)

AHU system #2:
AHU with heat recovery = 71 %, heater, chiller, central heat generation, chiller integrated in AHU (direct evaporator)

Period under consideration: 15 years
Amortization: AHU system #2 vs. AHU system #1 = 0.42 years

Your Optimal Planning Tool

Don't buy just any air handling unit. Compare various makes, AHU concepts, and components, taking into account your specific conditions of use in accordance with current standards and regulations (EPBD, EnEV, DIN V 18599, EEWärmeG, VDI 2067-1, etc.). TrueBlue also allows to determine the appropriate air conditioning system and potential savings in the context of the energetic inspection.

Customized and precise
For the TrueBlue efficiency certificate, the system concepts are simulated on the basis of one-hour intervals using global weather data for your installation site.

Transparent
We list results and characteristics required for standard-compliant certification and for the application for subsidies (e.g. EEWärmeG).

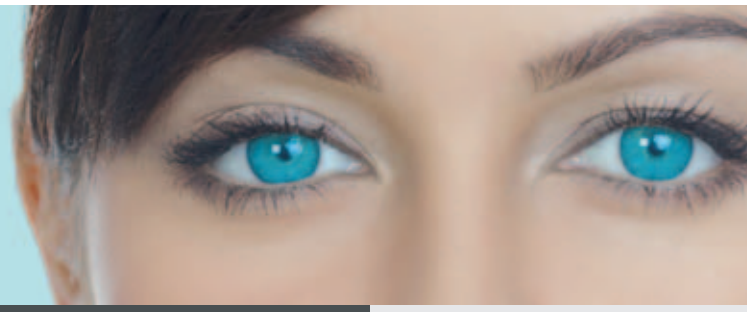
Normative and more
Apart from the values required by the standards, you obtain further results having an impact on the cost of operation. For instance, the humidifier water volume is determined.

Assessment of the entire system
Heat generation and refrigeration (final energy) are assessed in addition to the theoretical energy demand of the room. Conventional heat generation and refrigeration can be compared objectively to the integrated technology by robatherm.

Economic efficiency and amortization
Opt for the right concept scoring best in terms of whole-life cost. This allows you to make the optimal purchase decision on the basis of precise data.

The TrueBlue efficiency certificate makes robatherm one of the first manufacturers to emulate the entire life cycle of air handling units.

trueblue
by robatherm



Efficiency Certificate

EnEV + DIN V 18599 + EEWärmeG + VDI 2067

Project data

Name	System #2
AHU type	RZ 27/18, weatherproof
Site (weather data)	Kassel, year of reference 07
Type of use	Retail/store
Operating time	6:00–20:00 h, 6-day week

Net energy calculation

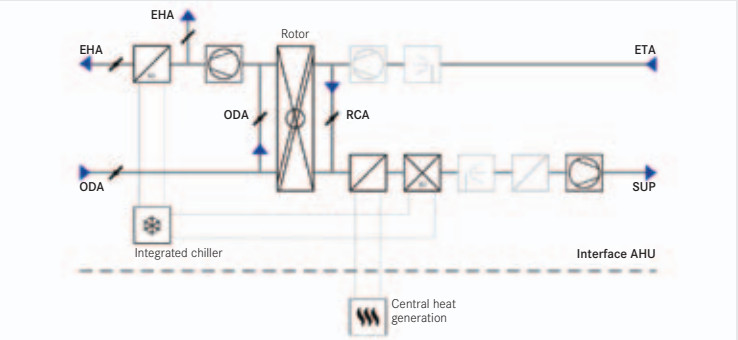
Air volume flow	31,000 m3/h
Supply air temperature	16–22 °C
P_M fan supply air	13.8 kW
P_M fan extract air	13.2 kW
Heat recovery coefficient	0.71 (EEWärmeG ≥ 0.7)
Heat recovery per year	369,570 kWh (EEWärmeG)
Humidity recovery coefficient	0.71
Heat recovery	COP 34.66 (EEWärmeG ≥ 10)
Heat recovery annual	COP 23.06

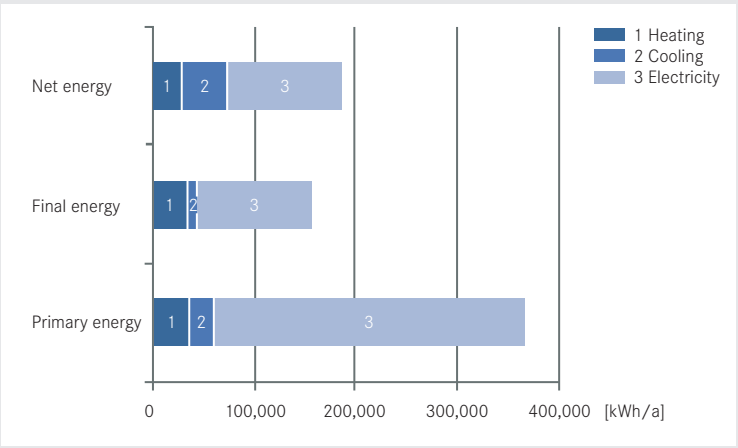
Final energy calculation

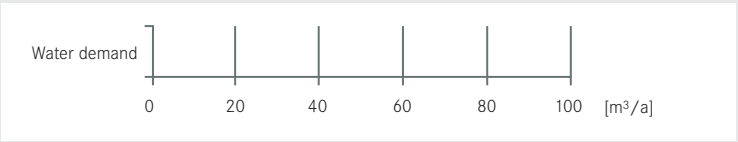
Heat generation/ distribution	external; EnEV reference technique (see EnEV 2009: Annex 2, Table 1)
Refrigeration/cooling energy distribution	Integrated chiller by robatherm Compressor Direct evaporator R407C EER 4.0 SEER 6.36

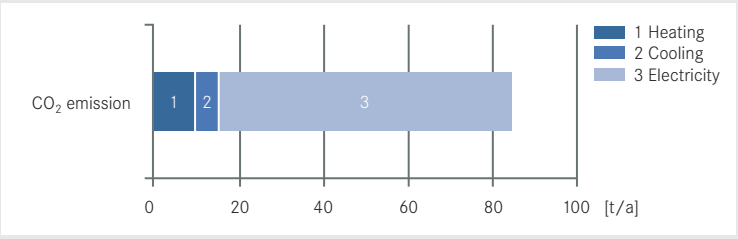
Primary energy/CO_2 emission calculation

Heat	Heating oil, extra light
Refrigeration/fan	Electricity mix









Thermal insulation

DIN EN 1886

Airtightness

DIN EN 1886

Air velocity

DIN EN 13053

Heat recovery efficiency

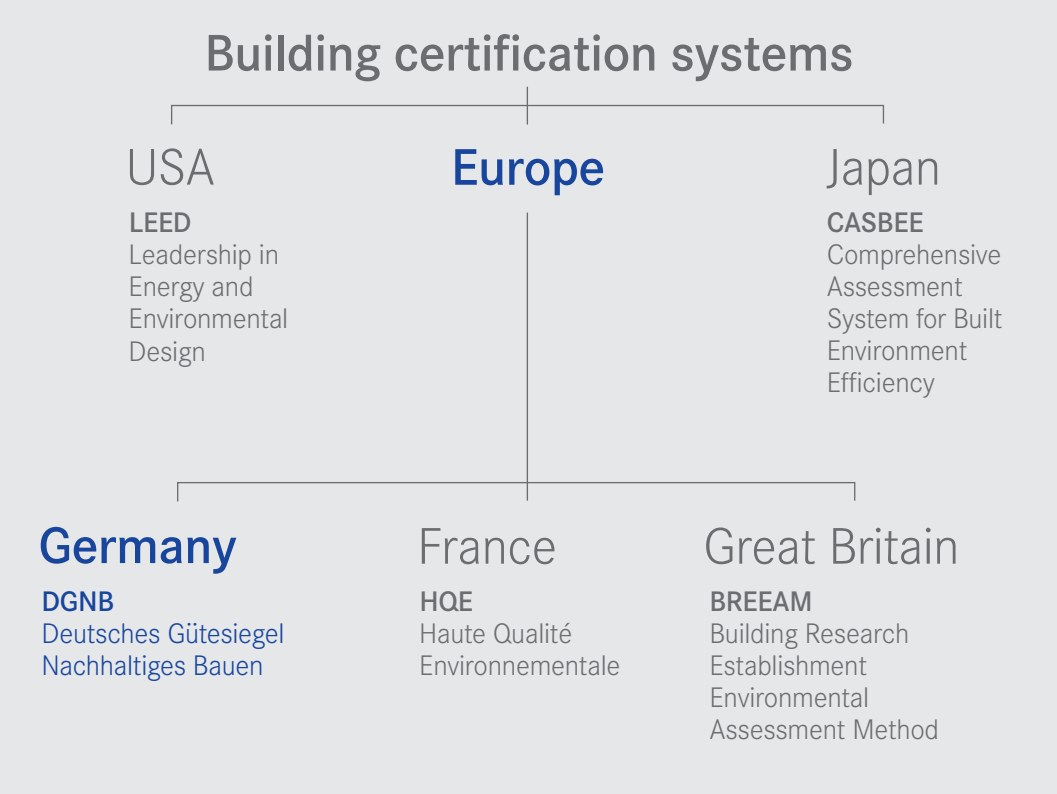
DIN EN 13053

Fan power

DIN EN 13779

Energy efficiency

Association of AHU manufacturers/ EUROVENT



Standards, Regulations, and Building Certification Systems

The energy performance of buildings is the established assessment criterion in the real estate industry.

Worldwide
At the international level, various calculation techniques and certification systems are used for assessing the energy performance of buildings.

In the United States, Japan, and Great Britain, practiced methods are LEED (U.S. Green Building Council), CASBEE, and BREEAM. LEED and BREEAM assess characteristics such as CO_2 emission, energy demand, water demand, location, public transport connection. Labels of energy performance assessment are “Gold” or “Platinum”, and “Good” or “Excellent”, respectively.

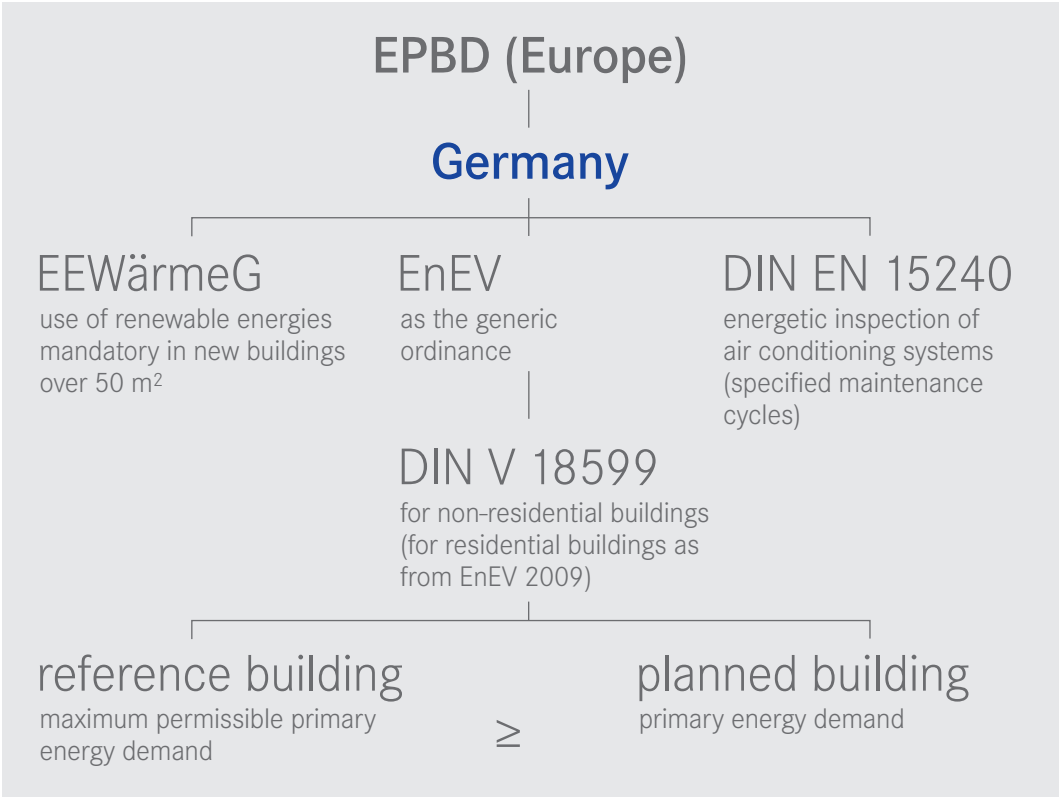
The Japanese CASBEE method calculates a ratio of negative environmental effects over positive benefits of a building.

Europe
European legislation too has addressed this trend. Since the coming into force of the European “Energy Performance of Buildings Directive” (EPBD) in January 2006, issuing energy performance certificates is mandatory in the member states.

This stipulation applies to

- new buildings
- existing buildings when let or sold
- existing public buildings with a floor space exceeding 1,000 m² (exceeding 500 m² from the date when EnEV 2012 comes into force).

Moreover, the directive specifies measures for the energetic inspection of air conditioning systems as the responsibility of builders/owners, vendors, and operators.



Germany
The Energy Savings Ordinance (EnEV) implements the EU Directive EPBD into national German legislation. The EnEV defines maximum values for the heat loss by transmission through the building envelope and for the annual primary energy demand.

After EnEV 2009 has already tightened the energetic requirements for buildings by 30%, EnEV 2012 is expected to go even further (efficiency principle).

The following requirements hold for non-residential buildings:

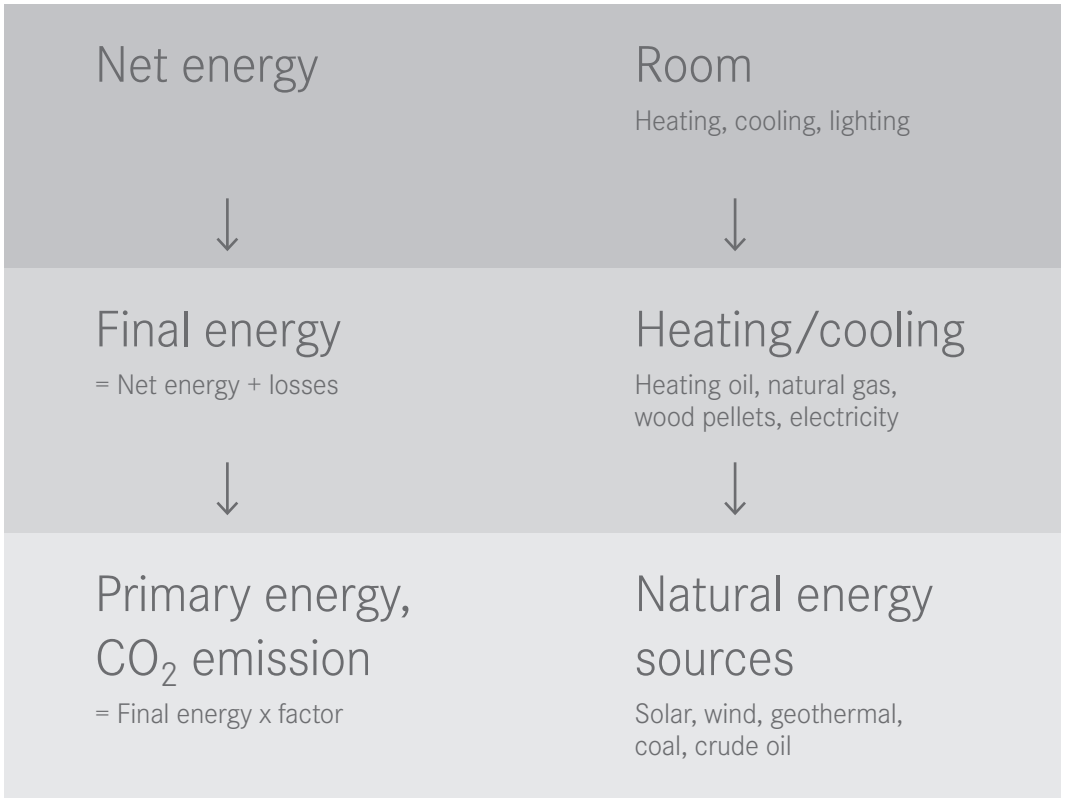
- Calculation to DIN V 18599
- Zoning of the building into areas of identical use
- Room balancing taking into account heating, domestic hot water, ventilation, and lighting
- Energetic inspection to EnEV, Section 12

The EnEV 2009 revision has introduced the new balancing method of DIN V 18599 for residential buildings, which can be used instead of the existing method specified in DIN V 4108-6 and DIN V 4701-10.

The calculation method to DIN V 18599 is a so-called “reference building method”.

For the purpose of public-law certification, the geometry, net floor space, orientation, and use of the planned building are calculated on the basis of the EnEV minimum quality standards. Then the result is determined under identical boundary conditions, using the actually planned technical characteristics of building services, building envelope, and sunshading.

The certification is provided if the primary energy demand of the planned building is lower than the maximum permissible value of the German EnEV reference building.



EnEV
Energy Savings Ordinance

EnEV and DIN V 18599 specify rules for calculating the energy demand of the various trades involved along the so-called "energy conversion chain".

Net energy is energy available to the user for the requested energy service (such as space heating, lighting).

Final energy is that part of primary energy available to the consumer after deduction of transport and conversion losses (as, e.g., in the case of heating oil, wood pellets).

Primary energy, in energy industry, is energy available as natural forms or sources of energy (such as coal, crude oil).

The calculation to EnEV starts out with the theoretical net energy demand of the room, subtracting the losses due to transfer, distribution, storage, and generation to yield the final energy demand.

Primary energy demand and CO_2 emission are calculated by applying factors to the final energy demand.

Examples of primary energy factors (non-renewable fraction) [-]:

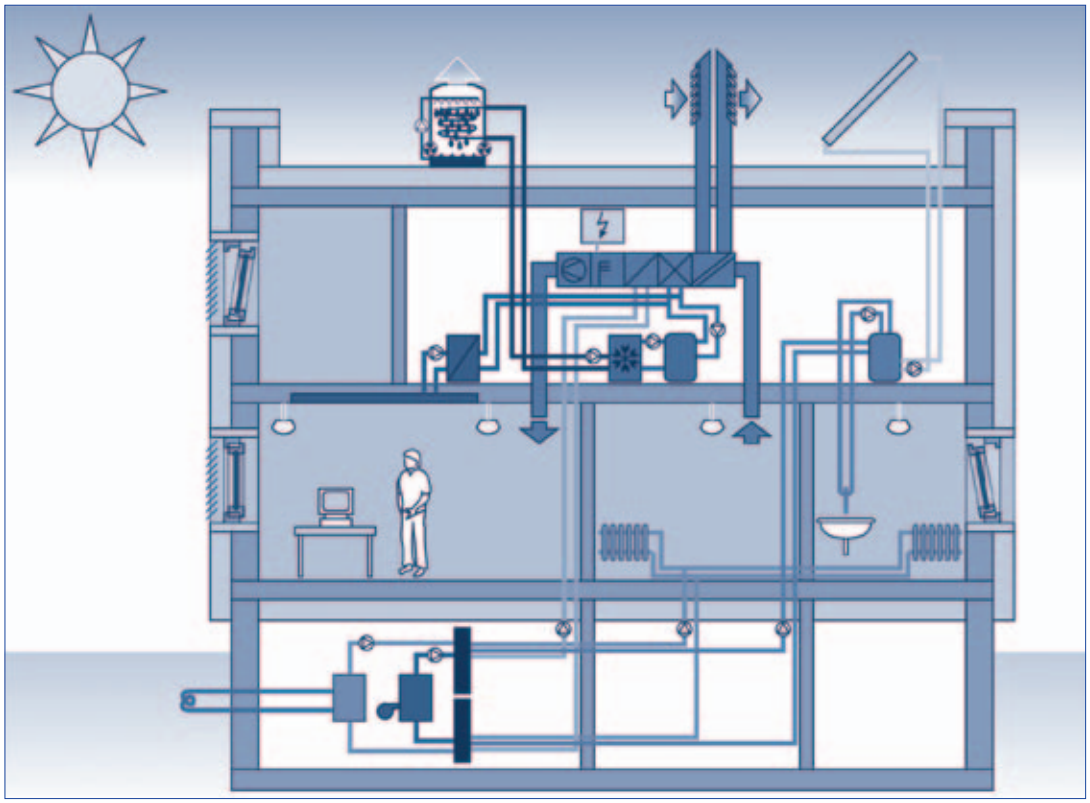
Wood = 0.2
Natural gas H = 1.1
Electricity mix = 2.6

Examples of CO_2 emission factors [g/kWh]:

Wood = 0
Natural gas H = 202
Electricity mix = 616

Quality of the air handling system valid for air conditioning systems (nominal chilling power > 12 kW) and air handling systems (supply air volume flow ≥ 4,000 m^3/h) in new and renovated buildings

- Specific Fan Power not less than SFP 4 to DIN EN 13779
- Heat recovery not less than class H3 to DIN EN 13053



By courtesy of DIN Deutsches Institut für Normung e. V.

DIN V 18599
Energy Performance of Buildings

DIN V 18599 describes a complex method for assessing the energy performance of buildings. The balancing method outlined in the standard covers, for instance, energy spent for heating, ventilation, air conditioning, potable water supply, and lighting.

The calculation includes all losses due to generation, storage, distribution, and transfer of energy.

For the sake of clarity, DIN V 18599 is structured into ten parts.*

- Part 1: General balancing procedures, terms and definitions, zoning and evaluation of energy sources
- Part 2: Net energy demand for heating and cooling of building zones
- Part 3: Net energy demand for air conditioning
- Part 4: Net and final energy demand for lighting
- Part 5: Final energy demand of heating systems
- Part 6: Final energy demand of ventilation systems and air heating systems for residential buildings
- Part 7: Final energy demand of air-handling and air-conditioning systems for non-residential buildings
- Part 8: Net and final energy demand of domestic hot water systems
- Part 9: Net and final energy demand of combined heat and power generation plants
- Part 10: Boundary conditions of use, climatic data (33 use profiles, such as open-plan office, store, manufacture)
- Part 100: Amendments to Part 1 through Part 10. These amendments will be incorporated in the revised DIN V 18599 to be issued in fall 2011.

* The brochure “Leitfaden für Energiebedarfsausweise im Nichtwohnungsbau” issued by the Federal Ministry of Transport, Building and Urban Development (BMVBS) offers a very good survey. It can be downloaded at www.bmvbs.de.

EEWärmeG
Renewable Energies Heat Act

Since 2009 already, the EEWärmeG has stipulated the use of renewable energies in new buildings with useful areas in excess of 50 m².

Coverage fraction of regenerative energy
Depending on the type of regenerative energy, the total energy demand for heating and cooling shall be covered by various fractions:

- solar radiation energy ≥ 15%
- biogas ≥ 30%
- biomass, liquid or solid ≥ 50%
- geothermal energy, ambient heat, waste heat ≥ 50%

  Systems recovering waste heat are recognized as so-called “alternative measures” (for further information see FGK Status Report No. 20).

To achieve the specified coverage fraction, renewable energies and alternative measures may be combined on a pro-rata-basis.

Permissible alternative measures for waste heat recovery:

- heat recovery (heat and cold)
- reversible heat pumps
- adiabatic exhaust air humidification

Creditable heat recovery systems

- heat recovery efficiency ≥ 70%
- COP ≥ 10
  (use of waste heat [kW] over electric energy input of heat recovery system [kW])

Public buildings serving as role models
The amended EEWärmeG (valid as from May 1, 2011) requires public buildings to act as role models in the use of renewable energies. The requirement also holds for existing buildings undergoing so-called “substantial renovation”. However, the coverage fractions applicable here are reduced (cf. EEWärmeG, Section 5a)

Inspection intervals	
Year of construction	Inspection
before Oct. 1, 1987	by Oct. 1, 2009
Oct. 1, 1987 through Sept. 30, 1995	by Oct. 1, 2011
Oct. 1, 1995 through Sept. 30, 2003	by Oct. 1, 2013
as from Oct. 1, 2003	in the tenth year following commissioning
After the first inspection, the system shall undergo recurrent energetic inspections at least every ten years.	

Energetic Inspection of Air Conditioning Systems

Fund programs
A multitude of funding measures are offered to individuals, commercial and industrial businesses, and public institutions by the Federal Government, local government, the municipalities, and the energy providers.

Information on the funding conditions and regarding the filing of application, particularly the time of application, can be found on the website www.energie-foerderung.info (BINE information service/ German Energy Agency dena) by entering ZIP code and envisaged funding measure.

The range of fund programs is very comprehensive. Examples include federal consultancy subsidies and a renewable energy incentive program www.erneuerbare-energien.de.

EPBD and EnEV stipulate the energetic inspection of air conditioning systems. A clear definition is given in DIN EN 15240 “Guidelines for inspection of air conditioning systems” (for further information see FGK Status Reports Nos. 5, and 6).

Air conditioning systems with a nominal chilling power in excess of 12 kW are subject to periodic energetic inspection in accordance with Section 12 of the EnEV.

The inspection comprises:

- verification of system efficiency and system dimensioning against the cooling demand of the building
- suggestions for possible improvements or for a replacement of the air conditioning system (alternative solutions)

robatherm

the air handling company

Industriestrasse 26 · 89331 Burgau · Germany
Tel. +49 8222 999-0 · Fax +49 8222 999-222
www.robatherm.com · info@robatherm.com