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EPB in Hungary

Expert study, summarizing and documenting the development of the implementation process of EPBD II in Hungary

prepared for the project
Visegrad countries together for better environmental standards in buildings
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Magyar Környezettudatos Építés Egyesülete
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EPB in Hungary

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7/2006. (V. 24.) TNM order on definition of energy performance of buildings has already introduced.
Introduce of the order means that the new calculation method is a part of the building permit and use permit application.
Certification of the new buildings is obligatory from 1st. of January 2009.

The calculation method consists of three main steps:

1. **Calculation of thermal transmittance for the different construction element.**

   According to the present regulation:

Covering structural elements	Thermal transmittance U ($W/m^2/K$
Perimeter wall	0,45
Flat roof	0,25
Attic slab	0,30
Covering structure of heated area	0,25
Lower closing slab above the arcade	0,25
Lower closing slab above non-heated basement	0,50
Facade glazed windows with wood or PVC frame	1,60
Facade glazed windows with aluminum frame)	2,00
Facade glazed windows ($A \leq 0,5m^2$)	2,50
Glazed wall on the façade with frame	1,5
Lighting area in the roof	2,50
Roof windows	1,70
Facade non-glazed gate	3,00

Door between facades and heated and non-heated area	1,80
Wall between heated and non-heated area	0,50
Wall between the neighbors buildings	1,50
Wall which are touch the soil in height 0-1 m	0,45
Perimeter floor laid on the soil in 1,5 m wide zone	0,50

The planned U value for the future:

Covering structural elements		Thermal transmittance U [W/m^{2}K]		
		2012	2015	2019[2)]
1	Perimeter wall	0,30	0,24	0,20
2	Flat roof	0,20	0,17	0,14
4	Covering structure of heated area	0,20	0,17	0,14
3	Attic slab	0,20	0,17	0,14
5	Lover closing slab above the arcade	0,20	0,17	0,14
6	Lover closing slab above the non-heated basement	0,30	0,28	0,25
7	glass	1,10	1,00	0,80
8	Special glass because acoustic issues	1,30	1,20	1,00
9	Facade glazed widows with wood or PVC frame	1,30	1,15	1,00
10	Facade glazed widows with wood or PVC frame	1,50	1,40	1,30
11	Facade fully glazed windows	1,50	1,40	1,30
12	Glazed roof	1,60	1,45	1,30
13	Smoke evacuation windows at the roof	2,00	1,70	1,40
14	Roof windows	1,40	1,25	1,10
15	Industrial gates and fire rated gates	3,00	2,00	2,00
16	Door between non-heated areas	1,60	1,45	1,30
17	Gates between non-heated areas	2,00	1,80	1,60
18	Walls between non-heated areas	0,33	0,30	0,25
19	Walls between heated buildings next to neighbours	1,50	1,50	1,50
20	Walls which are touch the soil in height 1 m	0,40	0,30	0,25
21	Perimeter floor laid on thze soil in 1,5 m wide zone	0,40	0,30	0,25

2. Calculation of the specific heat loss coefficient and compare to the allowed limit

$A/V \leq 0,3$	$q_m=0,2$	W/m^3K
$0,3 \geq A/V \leq 1,3$	$q_m=0,086+0,38(\Sigma A/V)$	W/m^3K
$A/V \geq 1,3$	$q_m=0,58$	W/m^3K

A=cool down area
V=Volume of air heated zone
Calculation of the specific heat loss coefficient:

- WinWatt or other accepted software,
- detailed calculation,
- simplified calculation

detailed calculation: $q=1/V(\Sigma AU+\Sigma I\psi-(Q_{SD+}Q_{SID})/72)$
simplified calculation: $q=1/V(\Sigma AU_R+\Sigma I\psi-Q_{SD}/72)$

Where:
U= surface thermal transmittance
Ur=resultant thermal transmittance coming from the effect of thermal bridge
I=length of connection edges
Ψ= linear thermal transmittance
Q_{sd}=direct heat gain from radiation
Q_{sid}= indirect heat gain from radiation

3. Calculation of totalized energy performance and compare to the allowed limit

Office buildings:

$A/V \leq 0,3$	$E_p=132kWh/m^2a$
$0,3 \geq A/V \leq 1,3$	$E_p=94+128A/V\ kWh/m^2a$
$A/V \geq 1,3$	$E_p=260kWh/m^2a$

Residential buildings and other accommodations:

A/V≤0,3	E_p=110kWh/m^{2}a
0,3≥A/V≤1,3	E_p=74+120A/V kWh/m^{2}a
A/V≥1,3	E_p=230kWh/m^{2}a

Educational buildings:

A/V≤0,3	E_p=90kWh/m^{2}a
0,3≥A/V≤1,3	E_p=40,8+164A/V kWh/m^{2}a
A/V≥1,3	E_p=254kWh/m^{2}a

A=cool down area
V=Volume of air heated zone

Calculation of the totalized energy performance

- WinWatt or other accepted software,
- detailed calculation,
- simplified calculation

$E_p=E_F+ E_H\ E_{HMV}+E_{vil}+E_{lt}$

Where:
E_F= Annual specific primer energy demand for heating system
E_H= Annual specific primer energy demand for cooling system
E_{HMV}= Annual specific primer energy demand for hot water system
E_{VIL}= Annual specific primer energy demand for lighting system (N/A at residential buildings
E_{LT}= Annual specific primer energy demand for ventilation system

Totalized energy performance and base of reference value:

Classes	Deviation %	Definition of building
A+	≤55	Very energy saving
A	56-75	Energy saving
B	76-95	Better than requirement
C	96-100	Meet the requirement
D	101-120	Approximate the requirement
E	121-150	Better than average
F	150-190	Average

G	191-251	Approximate the average
H	251-340	Weak
I	341<	Not good

Summary of the calculation method

1. Define of the function, basic date, requirements of the buildings
2. Define of geometrical basic data, includes the perimeter of structural elements which are calculated based on the linear thermal transmittance.
3. Calculate the rate of cool down area and volume of air in heated zone
4. Read of the specific heat loss coefficient value according to the A/V diagram
5. Define of designed value of the specific heat loss coefficient
6. Control of over warm risk in summer
7. Calculation of net energy use for heating
8. Define of losses of the heating system
9. Define of electrical added energy for heating system
10. Calculation of primer energy use for heating system
11. Calculation of net energy use for hot water
12. Define of losses of the hot water system
13. Define of electrical added energy for hot water system
14. Calculation of primer energy use for hot water system
15. Calculation of heat balance of ventilation
16. Calculation losses of the ventilation system
17. Define of electricity for ventilation
18. Calculation of primer energy use for ventilation system
19. Calculation of primer energy use for cooling system
20. Calculation of yearly electricity for lighting
21. Define of gain coming from the building system
22. Calculation of totalized energy performance

Factor for primer energy source:

Energy	e
electricity	2,5
electricity out of peak	1,8
gas	1
oil	1
coal	0,95

district heating	1,2
cogeneration's district	1,12
Biomass, wood	0,6
Geothermic, wind etc:	0

Other basic design criteria

Building	Air change of heating period n [1/h] 1)	2)	3)	Net heat energy of domestic water q_{HMV} [kWh/m^{2}a]	Lighting q_{vil} [kWh/m^{2}a]	Correction factor for lighting υ 4)	Correction factor for periodic operation σ 5)	Heat gain q_b [W/m^2]
Residential	0,5			30	(8)	-	0,9	5
Office buildings	2	0,3	0,8	9	22	0,7	0,8	7
Educational buildings	2,5	0,3	0,9	7	12	0,6	0,8	9

CURRENT EPBD I (2002/91/EC) REQUIREMENTS

Summary of requirements

Energy certificate

Included energy systems

Describe which and how of the following main energy systems are included in the energy certificate in your country.

- Heating-entire building heating is a part of calculation
- Hot water-entire building heating is a part of calculation
- Cooling-entire building heating is a part of calculation
- Ventilation-entire building heating is a part of calculation
- Artificial lighting-entire building heating is a part of calculation

Main assessment criteria

Describe the main assessment criteria in energy certificates.

- Total primary energy consumption-see above
- Nonrenewable primary energy consumption-see above
- End-use energy consumption-see above
- Heating energy demand-see above
- Cooling energy demand-see above
- Mean U-value-see above
- Others?

Other informative indicators

Describe if there are some other informative indicators used in your country in order to provide further information for customer.

- Other assumed energy consumption (the rest of the pie excluding the main energy systems, for instance appliance, garages, exterior lighting etc.)-above ground has to be calculated, exterior lighting is not a part of calculation
- Total assumed energy operation costs-Not applicable
- Total CO_{2equ} operation emissions-Not applicable, however the official software (WinWatt) calculates based on the local factors
- Economical analysis of renewable energy, cogeneration, central heating plant-yes before starts the projects you have to assess the above mentioned items, you should create a feasibility study about the alternative energy supply

Method

Describe very briefly and shortly method used to work out an energy certificate by using at least the following points:

- Asset (only calculation based on drawings) vs. operation (only measured data used) rating-see above and you can calculate based on the calculation method or based on the measured values or based on the invoices of the public utility
- Binding / free methodology to be used- in case of complicated office building it is allowed to use energy modeling software like Eplus, eQuest, HAP or others.

Energy performance / efficiency requirements- there are no any indication of the minimum efficiency of the equipment

- Residential
  - New construction
    - Family houses

        - Multifamily
    - Major renovations
    - Partial renovations
        - Construction part
        - Technology
- Office and retail buildings
    - New construction
        - Office buildings
        - Retail buildings
        - Government buildings
    - Major renovations
    - Partial renovations
        - Construction part
        - Technology

Requirements for indoor quality

Please describe whether you have certain requirements of indoor quality included in the certification process. The criteria could be for instance:

- Prove of minimum ventilation requirements-based on the Hungarian regulation, but is not part of the local EPB
- Prove of summer overheating resistance-see above in the summary of the calculation method
- …

Official permission

Describe how and when should be the certificate provided to an official authority for approval.

1. Energy certificate is a part of the use permit
2. Energy certificate shall be submitted at the same time when use permit documentation

Market size

- Amount of certified experts-400
- Rough certification prices on the market
    - Family houses-10.000-50.000 HUF
    - Multifamily-10.000-50.000 HUF
    - Offices-500.000-1.000.000 HUF
    - Retail- N/A

Design of the certificate

Describe and show the certificate design. Try to assess marketing potential and easy-to-communication level.

Content of the Certificate based on the 176/2008 gov. order:
Name of the Client
Address of the building
Name of the Certificator
Specify primer energy consumption of the building
Reference values
Specify heat loss co efficiency
Classification
Geometrical basic data includes the perimeter of structural elements which are calculated based on the linear thermal transmittance.
Air changing rate
Heating demand
HMV
Air handling units
Lighting
A/V value
Suggested energy saving solutions and their effect of the building efficiency