

Status of implementation of EPBD and CEN EPB standards in Romania



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1. General information

1. Code of the energy performance calculation methodology - Mc001
2. Mc001 will probably enter into force by the end of 2019/beginning of 2020
3. CEN (EPB) standards are used, except for the group of standards for BAC
4. monthly calculation is used (hourly only if an accredited software is used)
5. there is no concrete methodology for software accreditation
6. there is no adapted software for the new Romanian Mc001
7. building or building unit (standard type) and apartment (simplified type)
8. there is a comparison to a reference building (no differentiation among building categories)
9. some of the excel files provided by the EPB Center are used for creating calculation examples in the Romanian methodology

2. Minimum thermal transmission, solar factor and energy requirements for Romanian buildings

a) Residential

Table 1. Minimum heat transfer coefficients (corrected for the bridge effect).

BUILDING COMPONENTS	U'_{max} [W/m ² K]
Outside opaque walls	0,40
Windows	1,10
Ceilings over the top floor, under terrace or attics	0,14
Floors over the unheated basement of cellar	0,35
Joint walls	0,90
Floors on the ground (ground level)	0,22
Floors at the bottom of the heated basements	0,21
Outside walls of the basement (underground)	0,35

Table 2. Recommended values for the solar factor of the glazed components of the residential buildings.

Solar Factor, g – glazed elements					
Orientation	Climatic zone				
	I	II	III	IV	V
Exposed to the solar radiation	0,30–0,37	0,33–0,43	0,37–0,47	0,43–0,50	> 0,50

For the residential buildings, the simultaneous mandatory conditions for energetic design are:

- $U' \leq U'_{\max}$ [W/(m²K)] for every building element,
- $G \leq GN$ [W/m³K], G-global coefficient for thermal insulation, GN- rated global coefficient for thermal insulation (reference values)
- The annual primary energy consumption for heating $q_{\text{year}} \leq q_{\text{year,max}}$, where for buildings with height < P+4E, $q_{\text{year,max}}=153$ kWh/m²an and for buildings with height $\geq P+4E$ $q_{\text{year,max}}=117$ kWh/m².y.

Table 3. Rated/reference values for GN.

Floor numbers N	A/V [m ² /m ³]	GN [W/m ³ K]	Floor numbers N	A/V [m ² /m ³]	GN [W/m ³ K]
1	0,80	0,39	4	0,25	0,14
	0,85	0,41		0,30	0,15
	0,90	0,43		0,35	0,16
	0,95	0,44		0,40	0,17
	1,00	0,46		0,45	0,18
	1,05	0,47		0,50	0,19
	$\geq 1,10$	0,48		$\geq 0,55$	0,19
2	0,45	0,29	5	0,20	0,13
	0,50	0,18		0,25	0,14
	0,55	0,20		0,30	0,15
	0,60	0,21		0,35	0,16
	0,65	0,21		0,40	0,17
	0,70	0,22		0,45	0,18
	$\geq 0,75$	0,22		$\geq 0,50$	0,18
3	0,30	0,14	≥ 10	0,15	0,12
	0,35	0,16		0,20	0,13
	0,40	0,17		0,25	0,14
	0,45	0,18		0,30	0,15
	0,50	0,19		0,35	0,16
	0,55	0,20		0,40	0,17
	$\geq 0,60$	0,21		$\geq 0,45$	0,17

b) Non-residential

Minimum requirements for EPB:

- for the building components, the condition refers to the maximum heat transmittance U'_{\max} [$W/(m^2K)$];
- for the overall building
 - a) overall coefficient for thermal insulation, $G1$ [$W/(m^3K)$] (if $G1 \leq G1_{\text{ref}}$ then the building respects the minimum requirements principle);
 - b) annual primary energy consumption for heating.

$G1_{\text{ref}}$ [$W/(m^3K)$] is calculated using the next formula:

$$G1_{\text{ref}} = \frac{1}{V} \left[\frac{A_1}{a} + \frac{A_2}{b} + \frac{A_3}{c} + d \cdot P + \frac{A_4}{e} \right] \text{ [W/(m}^3\text{K)]}$$

Table 4. Maximum annual primary energy consumption for heating, all climatic zones.

Non-residential building	Maximum annual primary energy consumption $q_{\text{year,max}}$ [$kWh/m^2\text{an}$]
Office buildings	60
Commercial buildings	101
Education buildings	123
Health buildings	149
Tourism buildings	81

where a, b, c, d and e have the values in **Table 5** and **Table 6**, according to the building category, the building typology and the climatic zone.

Table 5. Coefficient values a, b, c, d and e for the category 1 buildings.

Building type	Climatic zone	a [m^2K/W]	b [m^2K/W]	c [m^2K/W]	d [W/mK]	e [m^2K/W]
Hospitals, kindergardens, clinics	I	1,70	4,00	2,40	1,40	0,77
	II	1,75	4,50	2,50	1,40	0,77
	III	1,80	5,00	2,90	1,40	0,77
	IV	1,85	5,50	3,00	1,40	0,77
	V	1,90	6,00	3,10	1,40	0,77
Education and sport buildings	I	1,70	4,00	2,10	1,40	0,77
	II	1,75	4,50	2,50	1,40	0,77
	III	1,80	5,00	2,90	1,40	0,77
	IV	1,85	5,50	3,00	1,40	0,77
	V	1,90	6,00	3,10	1,40	0,77
Office and commercial buildings, hotels*)	I	1,60	3,50	2,40	1,40	0,70
	II	1,70	4,00	2,50	1,40	0,70
	III	1,80	4,50	2,60	1,40	0,70
	IV	1,85	5,00	2,70	1,40	0,70
	V	1,90	5,50	2,80	1,40	0,70
Other buildings (industrial buildings normal usage)	I	1,10	3,00	1,10	1,40	0,60
	II	1,10	3,00	1,20	1,40	0,60
	III	1,10	3,00	1,30	1,40	0,60
	IV	1,10	3,00	1,40	1,40	0,60
	V	1,10	3,00	1,50	1,40	0,60

*) for the accommodation spaces the rules for residential buildings apply.

Table 6. Coefficient values a, b, c, d and e for the category 2 buildings.

Building type	Climatic zone	a	b	c	d	e
		[m ² K/W]	[m ² K/W]	[m ² K/W]	[W/mK]	[m ² K/W]
Hospitals, kindergardens, clinics	I	1,50	4,00	2,00	1,40	0,77
	II	1,55	4,50	2,30	1,40	0,77
	III	1,60	5,00	2,60	1,40	0,77
	IV	1,65	5,50	2,65	1,40	0,77
	V	1,70	6,00	2,70	1,40	0,77
Education and sport buildings	I	1,50	4,00	2,00	1,40	0,77
	II	1,55	4,50	2,30	1,40	0,77
	III	1,60	5,00	2,60	1,40	0,77
	IV	1,65	5,50	2,65	1,40	0,77
	V	1,70	6,00	2,70	1,40	0,77
Office and commercial buildings, hotels*)	I	1,50	3,50	2,00	1,40	0,70
	II	1,55	4,00	2,30	1,40	0,70
	III	1,60	4,50	2,60	1,40	0,70
	IV	1,65	5,00	2,65	1,40	0,70
	V	1,70	5,50	2,70	1,40	0,70
Other buildings (industrial buildings normal usage)	I	1,50	2,90	1,00	1,40	0,60
	II	1,55	2,90	1,10	1,40	0,60
	III	1,60	2,90	1,20	1,40	0,60
	IV	1,65	2,90	1,30	1,40	0,60
	V	1,70	2,90	1,40	1,40	0,60

*) for the accommodation spaces the rules for residential buildings apply.

Note:

Non-residential buildings category 1 = buildings with continuous occupation or discontinuous occupation and high inertia (i.e. the inside temperature doesn't go under the normal operation value with more than 7°C in the time interval 0 AM to 7 AM).

Non-residential buildings category 2 = buildings with discontinuous occupation and medium or low inertia (i.e. the inside temperature can go under the normal operation value with more than 7°C during max 10 hours per day but at least 5 hours in the time interval 0 AM to 7 AM).

The glazed elements shall fulfil, besides the condition concerning the thermal corrected transmittance, the optional condition for the optimum solar factor g.

a) if there are outside shading devices to control the solar energy, then the solar coefficient g must be higher than 0,50;

b) if there are no outside shading devices, the values of the solar coefficient g are indicated in the **Table 7**.

Table 7. Recommended values for the solar coefficient of the glazed components for non-residential buildings.

Solar coefficient, g – glazed building components					
Orientation	Climatic zone				
	I	II	III	IV	V
Exposed to the solar radiation	0,18–0,35	0,21–0,38	0,24–0,40	0,27–0,43	>40

If the glazed components are not exposed to the direct solar radiation, then solar coefficient g shall be > 0,50, no matter the climatic zone.

Energy requirements for Romanian nZEB

Table 8 gives the maximum total primary energy consumption (non-renewable and renewable sources)

and the maximum CO₂ equivalent emissions for nZEBs.

Table 8. Maximum total primary energy consumption (non-renewable and renewable sources) and the maximum CO₂ equivalent emissions for nZEBs.

Zona climatică	Orizont	CLĂDIRI DE BIROURI		CLĂDIRI DESTINATE ÎNVĂȚĂMÂNTULUI		CLĂDIRI DESTINATE SISTEMULUI SANITAR		CLĂDIRI DE LOCUIT COLECTIVE		CLĂDIRI DE LOCUIT INDIVIDUALE	
		Energie primară	Degajări CO ₂	Energie primară	Degajări CO ₂	Energie primară	Degajări CO ₂	Energie primară	Degajări CO ₂	Energie primară	Degajări CO ₂
		[kWh/m ² ,an]	[kg/m ² ,an]	[kWh/m ² ,an]	[kg/m ² ,an]	[kWh/m ² ,an]	[kg/m ² ,an]	[kWh/m ² ,an]	[kg/m ² ,an]	[kWh/m ² ,an]	[kg/m ² ,an]
I	31 dec. 2019	50	13	100	25	79	21	100	25	115	31
	31 dec. 2021	45	12	92	24	76	21	93	25	98	24
II	31 dec. 2019	57	15	120	35	97	27	105	28	121	34
	31 dec. 2021	57	15	115	30	97	26	100	27	111	30
III	31 dec. 2019	69	19	136	37	115	32	122	34	155	41
	31 dec. 2021	69	19	136	37	115	32	111	30	145	40
IV	31 dec. 2019	89	24	172	48	149	42	144	36	201	51
	31 dec. 2021	83	24	170	49	142	41	127	35	189	42
V	31 dec. 2019	98	28	192	56	174	49	152	38	229	57
	31 dec. 2021	89	24	185	53	167	48	135	37	217	54

3. Models of Romanian EPC (building/building unit & apartment)

EPC for a building or building unit (page 1):

EPC for an apartment (page 1):

CERTIFICAT DE PERFORMANȚĂ ENERGÉTICĂ
elaborat în conformitate cu Metodologia de Calcul a Performanței Energetice a Clădirilor, Ms001-2015

DATE PRIVIND IDENTIFICAREA CPE ȘI A AUDITORULUI ENERGÉTIC

CPE nr. valabil 10 ani până la dd/aaaa
cpccpp/pepcpe

Auditor energetic: nume & prenume
Certificat atestare: seria XX, nr. XXXX

Gradul: I sau II

DATE PRIVIND CLĂDIREA/UNITATEA DE CLĂDIRI CERTIFICATĂ

Categoria clădiri: Anul construirii/renovării majore: nZEB

Adresa clădiri: Aria de referință a pardoseli: FOTO CLĂDIRI max. 300x300dpi

Coordonate GPS (lat x long): Aria construită desfășurată: m²

Regim de înălțime: Volumul interior de referință: m³

Scopul elaborării CPE: V/I/R INFORMARE Program de calcul utilizat: versiunea

PERFORMANȚA ENERGÉTICĂ	CLĂDIRI REALĂ	CLĂDIRI REFERINȚĂ	NIVEL CALCULAT EMISII ECHIVALENTE CO ₂
Performanță energetică ridicată [kWh/m ² ,an - energie primară]			Nivel de poluare scăzut [kgCO ₂ /m ² ,an]
A+			A+
A			A
B			B
C			C
D			D
E			E
F			F
G			G
Performanță energetică scăzută [kWh/m ² ,an - energie primară]			Nivel de poluare ridicat [kgCO ₂ /m ² ,an]
Consum anual total de energie ... [kWh/an]	finală primară	xxx xxx	Indice de emisii echivalent CO ₂ [kgCO ₂ /an]
Consum anual specific de energie din surse regenerabile [kWh/m ² ,an]	Solar termic Pompe căldură Solar electric Biomasă (alt)	xxx xxx xxx xxx	Total xxx

Tip sistem instalație clădire reală / Consum anual specific de energie primară per utilitate [kWh/m²,an]:

Clasă energetică / Consum anual specific de energie primară per utilitate [kWh/m ² ,an]:	A+	A	B	C	D	E	F	G
Încălzire	s e1A c1A...c1B c1B...c1C c1C...c1D c1D...c1E c1E...c1F c1F...c1G >c1G			C1 Inc				
Apă caldă de consum	s e2A c2A...c2B c2B...c2C c2C...c2D c2D...c2E c2E...c2F c2F...c2G >c2G			C2 Inc				
Răcire	s e3A c3A...c3B c3B...c3C c3C...c3D c3D...c3E c3E...c3F c3F...c3G >c3G			C3 Inc				
Ventilare mecanică	s e4A c4A...c4B c4B...c4C c4C...c4D c4D...c4E c4E...c4F c4F...c4G >c4G			C4 Inc				
Iluminat artificial	s e5A c5A...c5B c5B...c5C c5C...c5D c5D...c5E c5E...c5F c5F...c5G >c5G			C5 Inc				

Semnătura și stampila auditorului:

CERTIFICAT DE PERFORMANȚĂ ENERGÉTICĂ
elaborat în conformitate cu Metodologia de Calcul a Performanței Energetice a Clădirilor, Ms001-2015

DATE PRIVIND IDENTIFICAREA CPE ȘI A AUDITORULUI ENERGÉTIC

CPE nr. valabil 10 ani până la dd/aaaa
cpccpp/pepcpe

Auditor energetic: nume & prenume
Certificat atestare: seria XX, nr. XXXX

Gradul: I sau II

DATE PRIVIND APARTAMENTUL CERTIFICAT

Categoria clădiri: rezidențială multifamilială Anul construirii/renovării majore: FOTO CLĂDIRI max. 300x300dpi

Adresa clădiri: Aria utilă de referință: m²

Coordonate GPS (lat x long): Aria construită desfășurată: m²

Regim de înălțime: Volumul de referință: m³

Scopul elaborării CPE: V/I/R INFORMARE Program de calcul utilizat: versiunea

PERFORMANȚA ENERGÉTICĂ	CLĂDIRI REALĂ	CLĂDIRI REFERINȚĂ	NIVEL CALCULAT EMISII ECHIVALENTE CO ₂
Performanță energetică ridicată [kWh/m ² ,an - energie primară]			Nivel de poluare scăzut [kgCO ₂ /m ² ,an]
A+			A+
A			A
B			B
C			C
D			D
E			E
F			F
G			G
Performanță energetică scăzută [kWh/m ² ,an - energie primară]			Nivel de poluare ridicat [kgCO ₂ /m ² ,an]
Consum anual total de energie ... [kWh/an]	finală primară	xxx xxx	Indice de emisii echivalent CO ₂ [kgCO ₂ /an]
Consum anual specific de energie din surse regenerabile [kWh/m ² ,an]	Solar termic Pompe căldură Solar electric Biomasă (alt)	xxx xxx xxx xxx	Total xxx

Tip sistem instalație clădire reală / Consum anual specific de energie primară per utilitate [kWh/m²,an]:

Clasă energetică / Consum anual specific de energie primară per utilitate [kWh/m ² ,an]:	A+	A	B	C	D	E	F	G
Încălzire	s e1A c1A...c1B c1B...c1C c1C...c1D c1D...c1E c1E...c1F c1F...c1G >c1G			C1 Inc				
Apă caldă de consum	s e2A c2A...c2B c2B...c2C c2C...c2D c2D...c2E c2E...c2F c2F...c2G >c2G			C2 Inc				
Răcire	s e3A c3A...c3B c3B...c3C c3C...c3D c3D...c3E c3E...c3F c3F...c3G >c3G			C3 Inc				
Ventilare mecanică	s e4A c4A...c4B c4B...c4C c4C...c4D c4D...c4E c4E...c4F c4F...c4G >c4G			C4 Inc				
Iluminat artificial	s e5A c5A...c5B c5B...c5C c5C...c5D c5D...c5E c5E...c5F c5F...c5G >c5G			C5 Inc				

Semnătura și stampila auditorului: