Thermal Insulation Characteristics of the Building Shell according to the New Legislation for Decreasing Energy Consumption in Buildings in Greece

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1 | Examine the thermal insulation properties of building shell that practice the conventional construction requirements in accordance with the new legislation, introduced in Greece in accordance with the **European Directive 2002/91/EC** on the energy performance of buildings.

2 | Compare the thermal insulation properties of the "new" building shells with those complying with earlier specifications.

3 | Indicate the outcomes of the new legislation in energy performance of buildings and new construction methods and materials use in Greece.

MAXIMUM U- VALUES ACCORDING TO KENAK

Exterior Wall Component	U-value [$Wm^{-2}K^{-1}$] Climatic Zone			
	A	***B***	***C***	***D***
Roofs	0.50	0.45	0.40	0.35
External Walls	0.60	0.50	0.45	0.40
External floors	0.50	0.45	0.40	0.35
Floor over ground	1.20	0.90	0.75	0.70
External walls in contact with the ground	1.50	1.00	0.80	0.70
Openings	3.20	3.00	2.80	2.60
Glass Facades	2.20	2.00	1.70	2.80

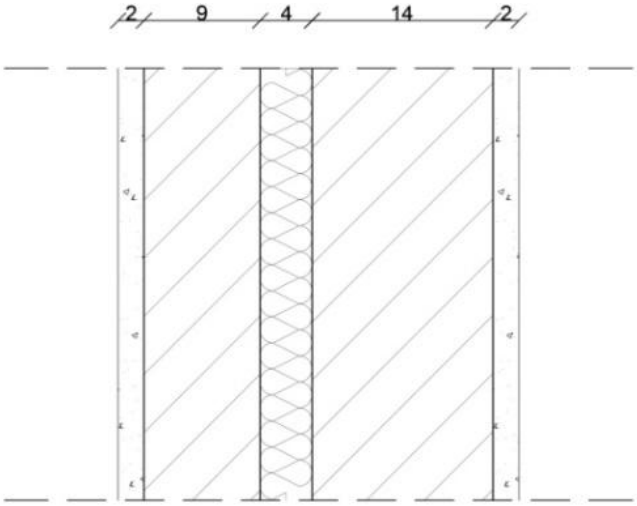
MAXILUM U-VALUES ACCORDING TO THE THERMAL INSULATION REGULATIONS OF 1980

Exterior Wall Component	U-value [$Wm^{-2}K^{-1}$] Climatic Zone		
	A	***B***	***C***
Roofs	0.50	0.50	0.50
External Walls	0.70	0.70	0.70
Floor over ground	3.00	1.90	0.70
External walls in contact with the ground	3.00	1.90	0.70
Roofs	0.50	0.50	0.50

$$U = \frac{1}{R_i + \sum_{j=1}^{n} \frac{d_j}{\lambda_j} + R_\alpha} \quad (Wm^{-2}K^{-1})(1)$$

Scope

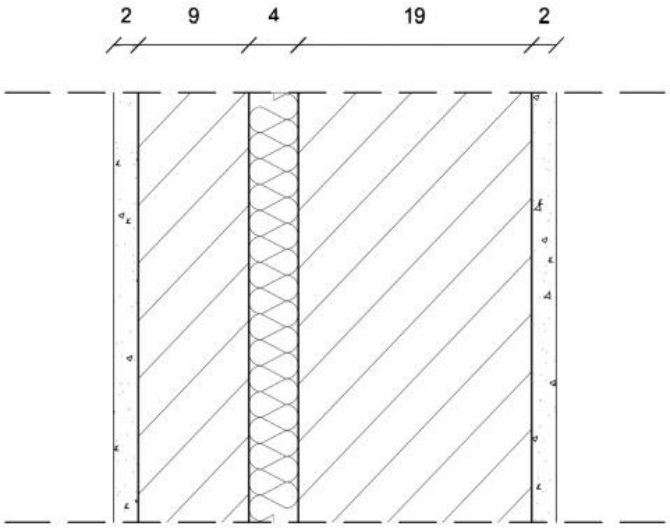
1st Case



Wall section layers:
a | plaster,2 cm
b | brick, 9 cm
c | extruded polystyrene, 4 cm
d | brick, 14 cm
e | plaster, 2 cm

	U-value ($W\ m^{-2}\ K^{-1}$)	Climatic Zones			
		A	***B***	***C***	***D***
1st Case	0.50	V	v	x	x
Replacement of thermal insulation thickness(5cm)	0.43	V	v	v	x
Replacement of thermal insulation thickness(6cm)	0,38	V	v	v	v
Additional external thermal insulation (3cm)	0.33	V	v	v	v

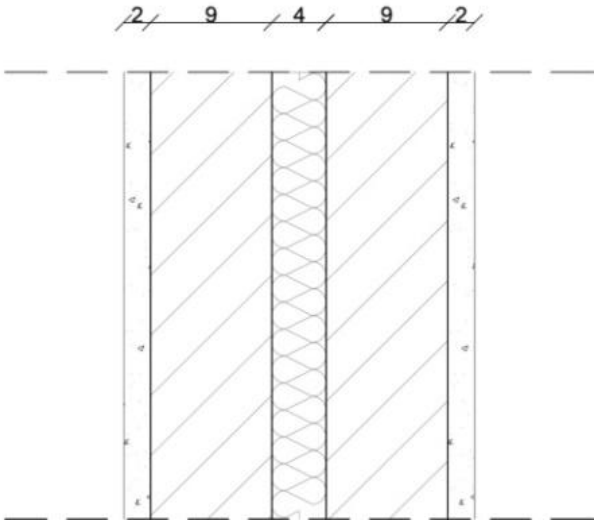
2nd Case



Wall section layers:
a.| plaster, 2 cm
b | brick, 9 cm
c | extruded polystyrene, 4 cm
d | brick, 19 cm
e | plaster, 2 cm

	U-value ($W\ m^{-2}\ K^{-1}$)	Climatic Zones			
		A	***B***	***C***	***D***
2nd Case	0.48	v	v	x	x
Replacement of thermal insulation thickness(5cm)	0.41	v	v	v	x
Replacement of thermal insulation thickness(6cm)	0.36	v	v	v	v
Additional external thermal insulation (3cm)	0.32	v	v	v	v

3rd Case



Wall section layers:
a. plaster, 2 cm
b. brick, 9 cm
c. extruded polystyrene, 5 cm
d. brick, 9 cm
e. plaster, 2 cm

	U-value ($W\ m^{-2}\ K^{-1}$)	Climatic Zones			
		A	***B***	***C***	***D***
3rd Case	0.45	v	v	v	x
Replacement of thermal insulation thickness(6cm)	0.39	v	v	v	v
Additional external thermal insulation (3cm)	0.35	v	v	v	v

1 | Typical exterior wall sections applied in conventional building constructions in Greece did not correspond to the requirements related to the buildings shell thermal insulation.

2 | Working only with the insulation thickness, in order to archive the desired U-value according to the new legislation, changes of the insulation thickness are required to improve the building shell.

3 | The U-value rates vary by increasing thermal insulation thickness from 1 to 2 cm. Especially, in case where thermal insulation thickness has been increased by 2 cm, U-value exceeds the requirements provided for the examined building shell components, in all climatic zones.

4 | Construction methods along with the decisions on the thermal insulation materials used, can lead in to a high energy performance of the building shell.