EWA

هيئة الكهرباء والماء

Electricity & Water Authority

العزل الحراري
في مباني مملكة البحرين
Samples of Cross Sections for Walls
نماذج للرسومات المقطعية للجدران

Important Note: These samples are intended for demonstration purposes only. Users should practice their due diligence to ensure that their designs are complying with local regulations. Actual Thermal Transmittance & Resistance values must be obtained from EWA approved manufacturers' / suppliers' documents.

Thermal Insulation Systems for Walls:

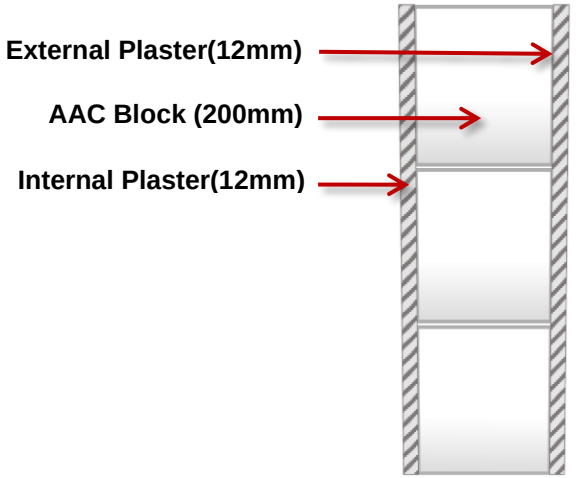
AAC Blocks:

i- For 200mm thick:

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	**AAC Block**	437	200	0.1084	1.845
4	Internal Plaster	1300	12	0.57	0.021
5	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.067
	Total Thermal Transmittance (U-value) W/m^2.K				**0.4838**

ii- For 250mm thick:

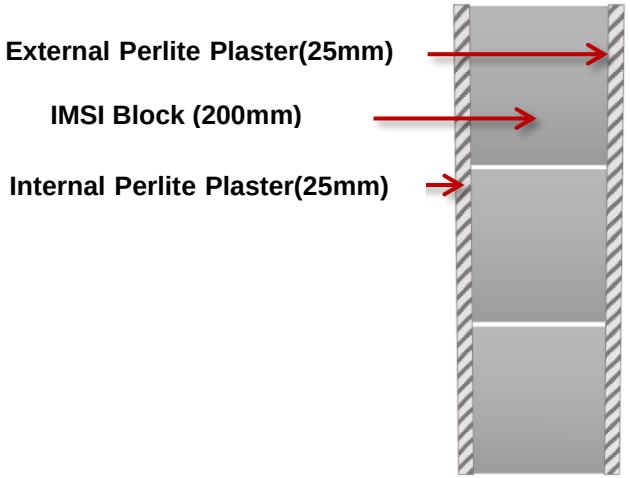
Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	**AAC Block**	469.5	250	0.1306	1.914
4	Internal Plaster	1300	12	0.57	0.021
5	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.136
	Total Thermal Transmittance (U-value) W/m^2.K				**0.468**



AAC Block
Autoclaved aerated concrete block

IMSI Blocks:

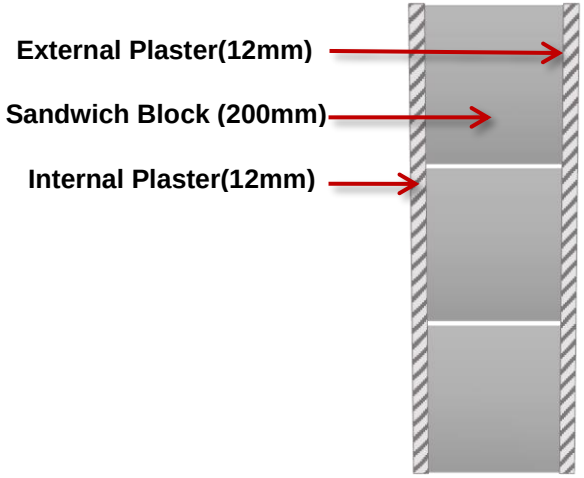
Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	**External Perlite Plaster**	408	25	0.08	0.3125
3	**IMSI Block**	2420	200	0.2024	0.988
4	**Internal Perlite Plaster**	408	25	0.08	0.3125
5	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.793
	Total Thermal Transmittance (U-value) W/m^2.K				**0.558**



IMSI Block
Concrete blocks with expanded polystyrene

- **Sandwich Block:**

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	**Sandwich Block**	2360	200	1.246	1.605
4	Internal Plaster	1300	12	0.57	0.021
5	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.827
	Total Thermal Transmittance (U-value) W/m^2.K				**0.547**

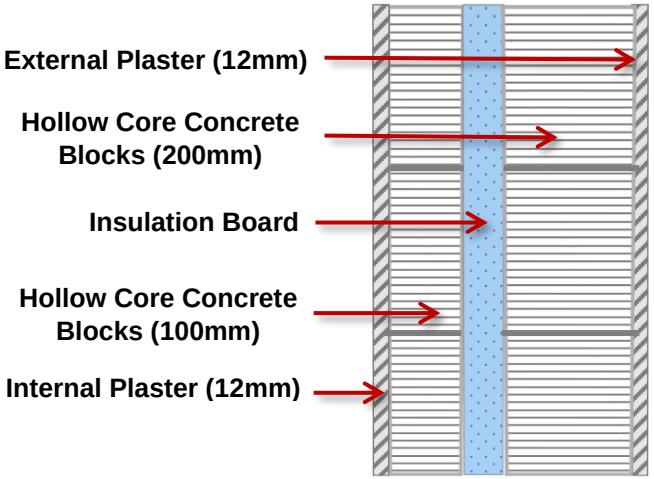


Sandwich Block
Concrete blocks with expanded polystyrene

Cavity Wall(Expanded Polystyrene / Extruded Polystyrene):

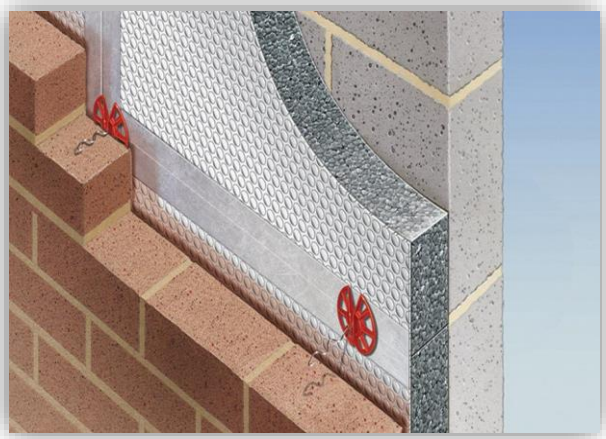
-Expanded polystyrene

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	Concrete Block	1350	200	0.885	0.226
4	**EPS**	18.5	60	0.0405	1.481
5	Concrete Block	1500	100	0.602	0.166
6	Internal Plaster	1300	12	0.57	0.021
7	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.095
	Total Thermal Transmittance (U-value) W/m^2.K				**0.477**



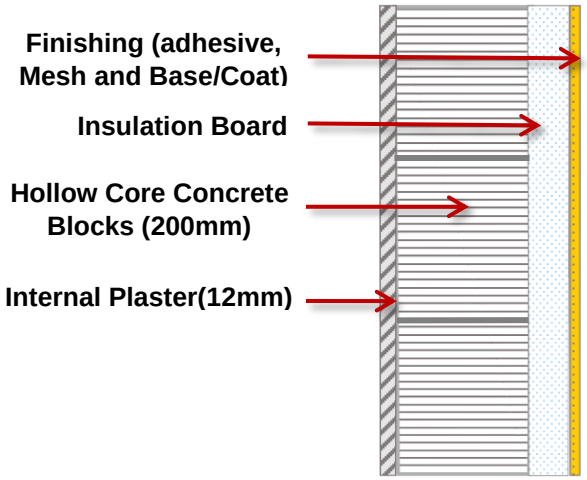
-Extruded polystyrene

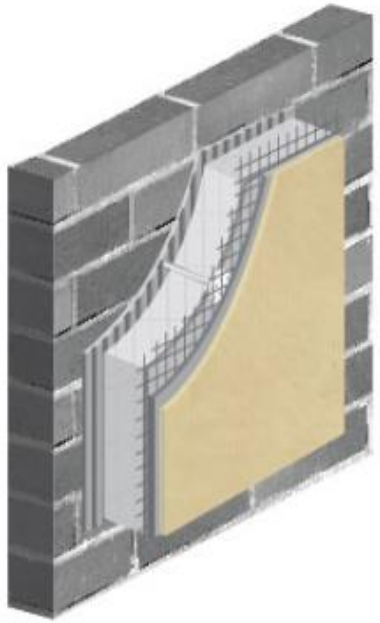
Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	Concrete Block	1350	200	0.885	0.226
4	**Insulated Board**	34.4	50	0.0241	2.075
5	Concrete Block	1500	100	0.602	0.166
6	Internal Plaster	1300	12	0.57	0.021
7	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.689
	Total Thermal Transmittance (U-value) W/m^2.K				**0.372**



External Thermal Insulation System with Expanded Polystyrene:

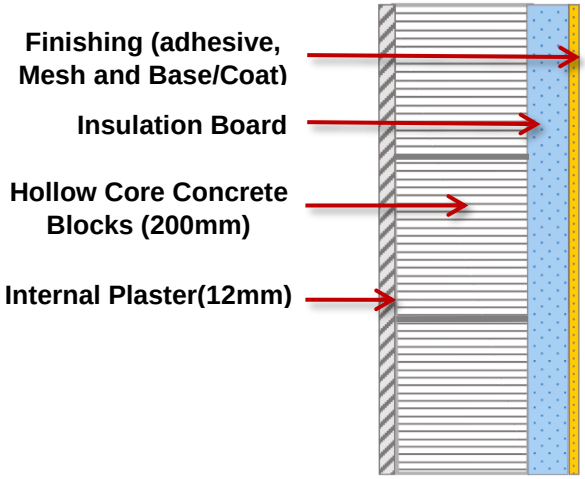
Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	Internal Plaster	1300	12	0.57	0.021
3	Concrete Block	1350	200	0.885	0.226
4	**EPS**	23	70	0.0371	1.887
5	Finishing	-	-	-	-
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.309
	Total Thermal Transmittance (U-value) W/m^2.K				**0.432**

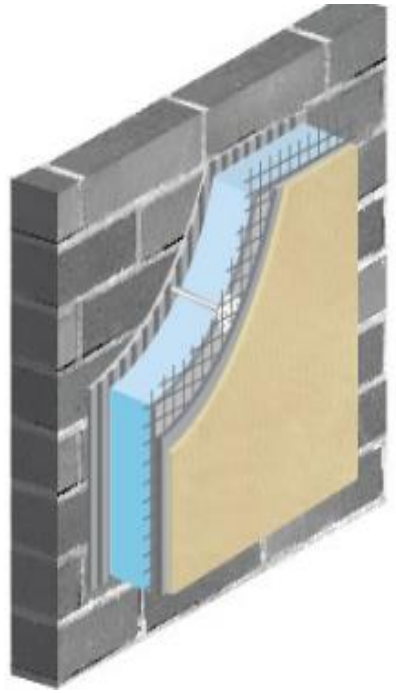




External Thermal Insulation System with Extruded Polystyrene:

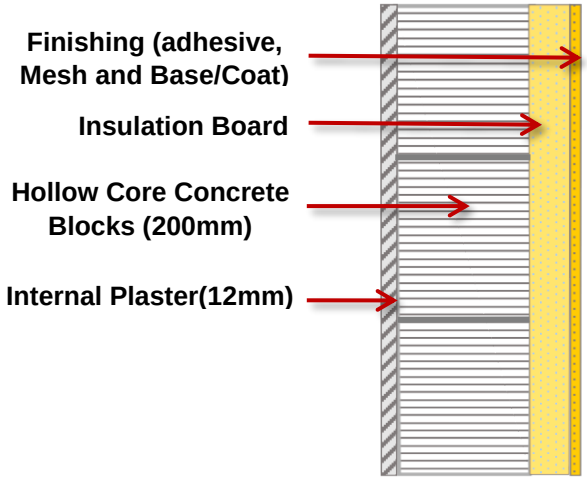
Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	Internal Plaster	1300	12	0.57	0.021
3	Concrete Block	1350	200	0.885	0.226
4	**XPS**	34.4	50	0.0241	2.0747
5	Finishing	-	-	-	-
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.5017
	Total Thermal Transmittance (U-value) W/m^2.K				**0.4**

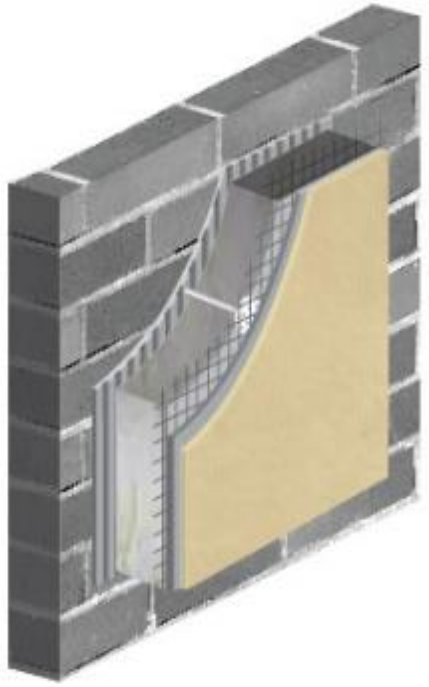




External Thermal Insulation System with Rockwool:

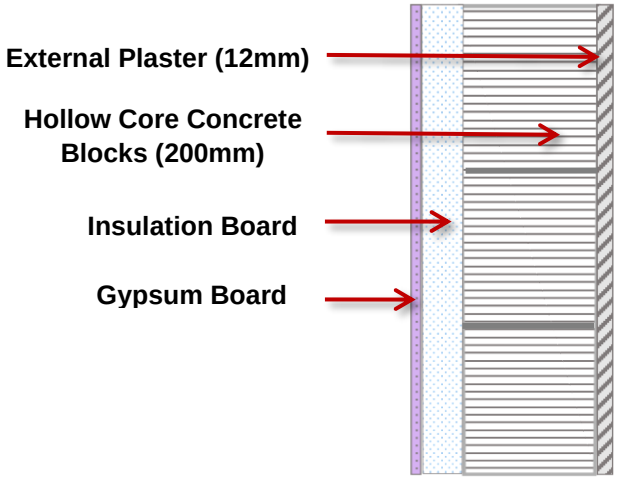
Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	Internal Plaster	1300	12	0.57	0.021
3	Concrete Block	1350	200	0.885	0.226
4	**Rockwool**	79.63	50	0.036	1.389
5	Finishing	-	-	-	-
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.816
	Total Thermal Transmittance (U-value) W/m^2.K				**0.55**



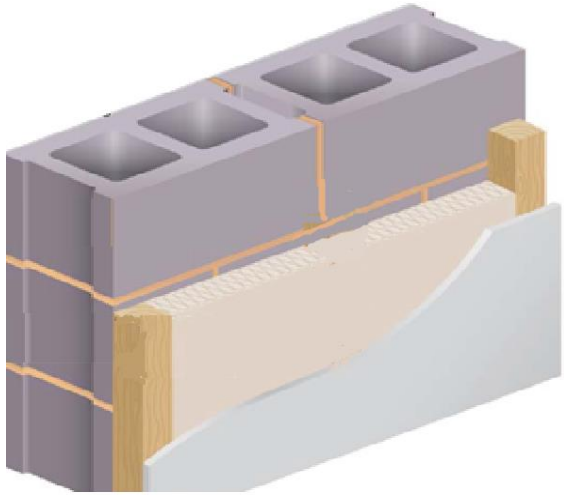


Internal Thermal Insulation System with Expanded Polystyrene

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	Concrete Block	1350	200	0.885	0.226
4	**EPS**	18.5	60	0.0405	1.481
5	Gypsum Board	950	15	0.16	0.09375
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.0
	Total Thermal Transmittance (U-value) W/m^2.K				**0.5**

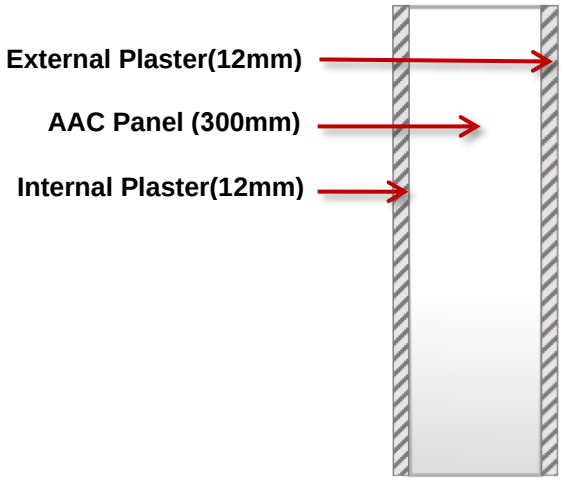


Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	Concrete Block	1350	200	0.885	0.226
4	**EPS**	23	70	0.0371	1.887
5	Gypsum Board	950	15	0.16	0.09375
5	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.408
	Total Thermal Transmittance (U-value) W/m^2.K				**0.415**



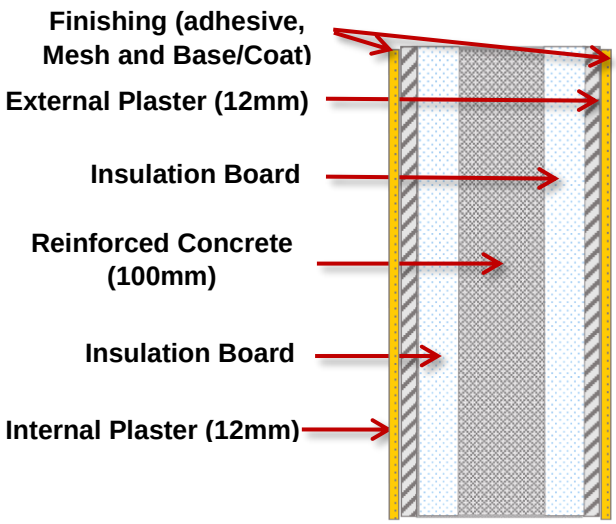
PAC Panels:

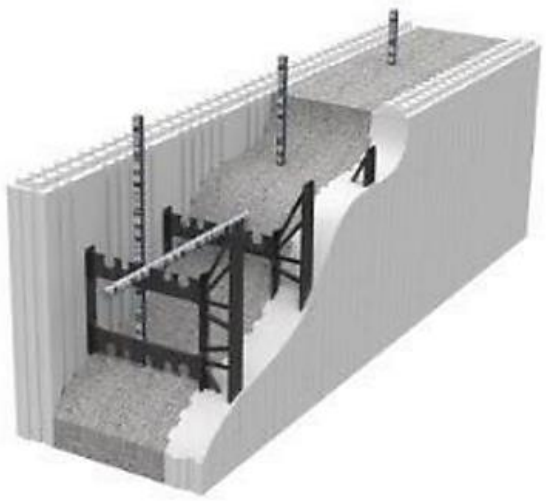
Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	**AAC Panels**	597.65	300	0.1715	1.75
4	Internal Plaster	1300	12	0.57	0.021
5	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.972
	Total Thermal Transmittance (U-value) W/m^2.K				**0.507**



Polystyrene/ Concrete Sandwich Panel

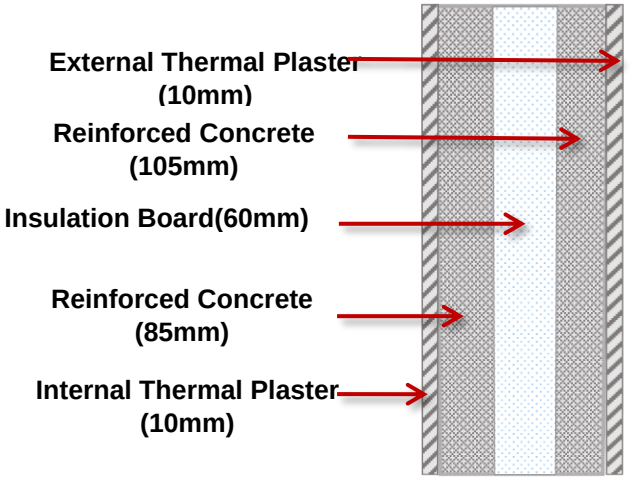
Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	**Insulated Board**	20	50	0.041	1.22
4	Reinforced Concrete	2500	100	2.5	0.04
5	**Insulated Board**	20	50	0.041	1.22
6	Internal Plaster	1300	12	0.57	0.021
7	Finishing	-	-	-	-
8	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.702
	Total Thermal Transmittance (U-value) W/m^2.K				**0.37**





Concrete/Polystyrene Sandwich Panel

Sr. No.	Element		Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance					0.059
2	**External Thermal Plaster**		181.5	10	0.06	0.167
3	**Precast Sandwich Panel**	Reinforced Concrete	2430	85	0.1642	1.5225
		EPS	19.4	60		
		Reinforced Concrete	2430	105		
4	**Internal Thermal Plaster**		181.5	10	0.06	0.167
5	Int. Surface Resistance					0.121
	Total Thermal Resistance (R) m^2.K/W					2.0365
	Total Thermal Transmittance (U-value) W/m^2.K					**0.491**

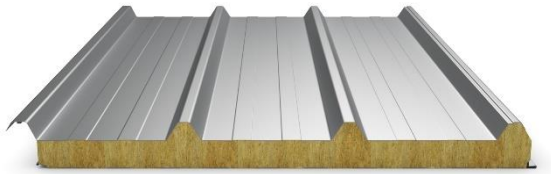


Precast Sandwich Panel

Thermal Plaster

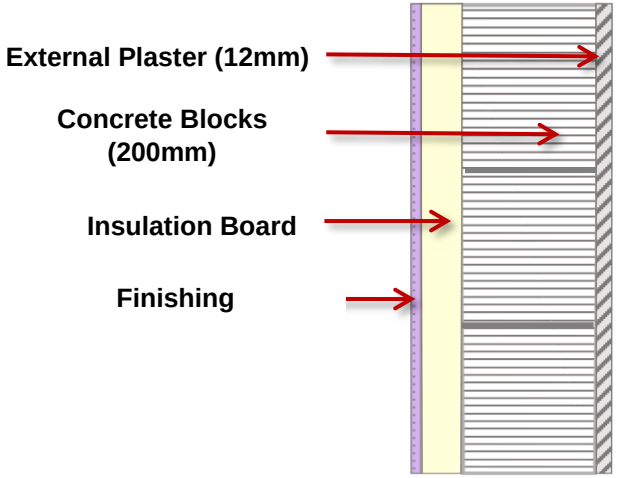
PIR Sandwich Panel:

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	**PIR Sandwich Panel**	36	50	0.026	1.923
3	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.103
	Total Thermal Transmittance (U-value) W/m^2.K				**0.475**



Internal Thermal Insulation System with Polyisocyanurate (PIR):

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	Concrete Block	1350	200	0.885	0.226
4	**PIR**	48	50	0.0231	2.164
5	Finishing	-	-	-	-
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.591
	Total Thermal Transmittance (U-value) W/m^2.K				**0.386**



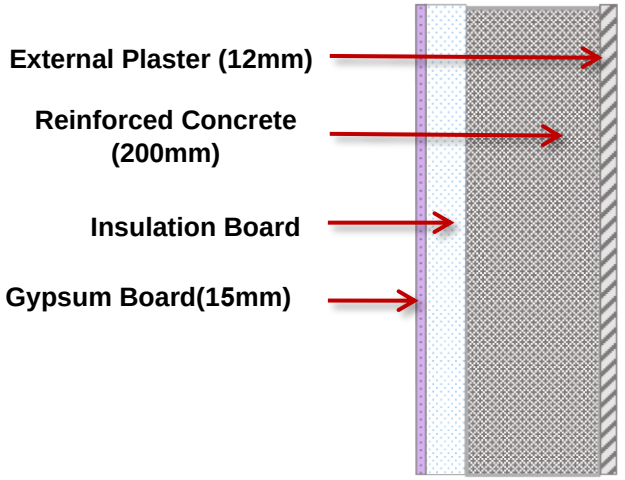
Thermal Insulation Systems for Columns & Beams/ Shear Walls

SYSTEM NAME / DESCRIPTION	CROSS SECTION / IMAGE

Internal Thermal Insulation:

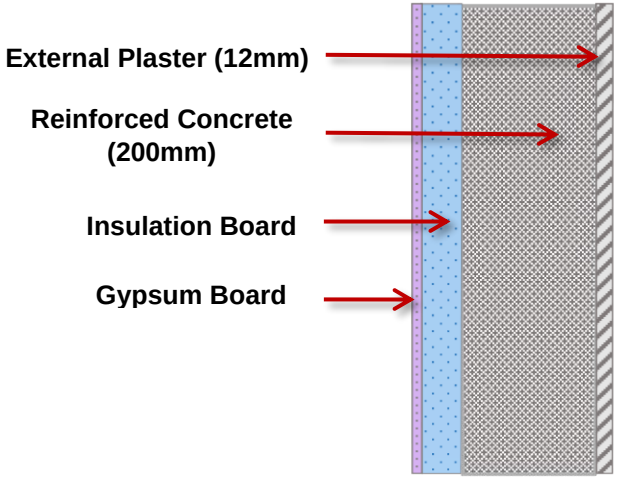
Type (1): Expanded Polystyrene:

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	Reinforced Concrete	2500	200	2.5	0.08
4	**EPS**	18.5	60	0.0405	1.481
5	Gypsum Board	950	15	0.16	0.09375
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.856
	Total Thermal Transmittance (U-value) W/m^2.K				**0.539**



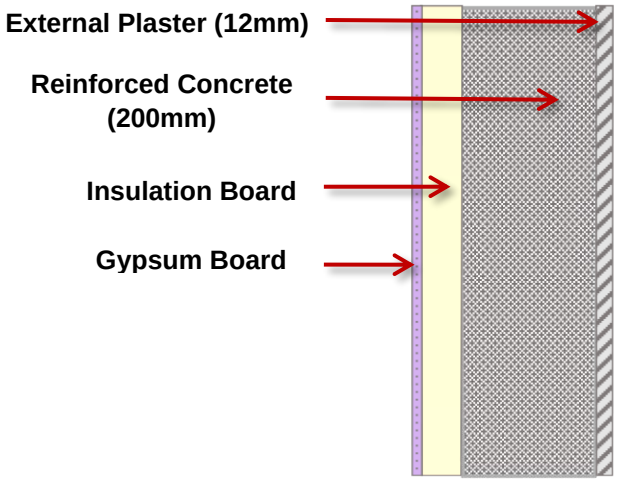
Type (2): Extruded Polystyrene:

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	Reinforced Concrete	2500	200	2.5	0.08
4	**XPS**	33	60	0.0358	1.676
5	Finishing	-	-	-	-
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.957
	Total Thermal Transmittance (U-value) W/m^2.K				**0.511**



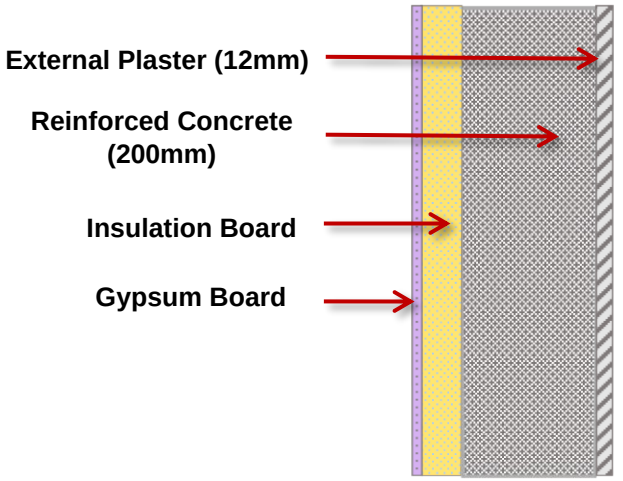
Type (3): Polyisocyanurate (PIR):

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	Reinforced Concrete	2500	200	2.5	0.08
4	**PIR**	48	50	0.0231	2.164
5	Finishing	-	-	-	-
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.445
	Total Thermal Transmittance (U-value) W/m^2.K				**0.41**



Type (4): Rockwool:

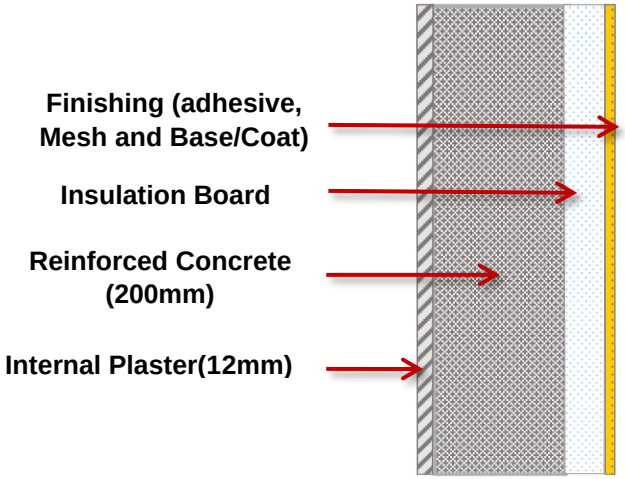
Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	External Plaster	1300	12	0.57	0.021
3	Reinforced Concrete	2500	200	2.5	0.08
4	**Rockwool**	158.06	60	0.0376	1.596
5	Finishing	-	-	-	-
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.877
	Total Thermal Transmittance (U-value) W/m^2.K				**0.533**



External Thermal Insulation:

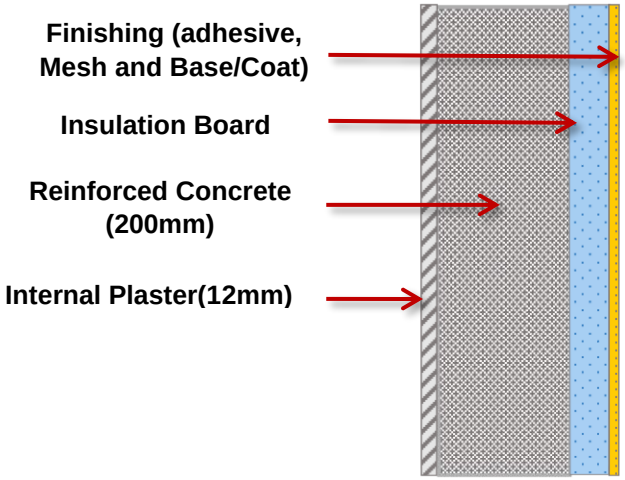
Type (1): Expanded Polystyrene:

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	Finishing	-	-	-	-
3	**EPS**	18.5	60	0.0405	1.481
4	Reinforced Concrete	2500	200	2.5	0.08
5	Internal Plaster	1300	12	0.57	0.021
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.762
	Total Thermal Transmittance (U-value) W/m^2.K				**0.567**



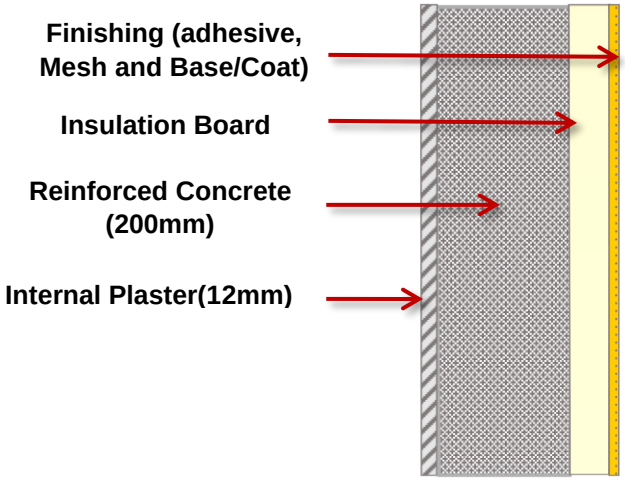
Type (2): Extruded Polystyrene:

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	Finishing	-	-	-	-
3	**XPS**	33	60	0.0358	1.676
4	Reinforced Concrete	2500	200	2.5	0.08
5	Internal Plaster	1300	12	0.57	0.021
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.957
	Total Thermal Transmittance (U-value) W/m^2.K				**0.511**



Type (3): Polyisocyanurate (PIR):

Sr. No.	Element	Density Kg/m^3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m^2.K/W
1	Ext. Surface Resistance				0.059
2	Finishing	-	-	-	-
3	**PIR**	48	50	0.0231	2.164
4	Reinforced Concrete	2500	200	2.5	0.08
5	Internal Plaster	1300	12	0.57	0.021
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				2.445
	Total Thermal Transmittance (U-value) W/m^2.K				**0.41**



Type (4): Rockwool:

Sr. No.	Element	Density Kg/m3	Thickness (mm)	Thermal Conductivity W/m.K	Thermal Resistance m2.K/W
1	Ext. Surface Resistance				0.059
2	Finishing	-	-	-	-
3	**Rockwool**	178.3	60	0.038	1.58
4	Reinforced Concrete	2500	200	2.5	0.08
5	Internal Plaster	1300	12	0.57	0.021
6	Int. Surface Resistance				0.121
	Total Thermal Resistance (R) m^2.K/W				1.861
	Total Thermal Transmittance (U-value) W/m^2.K				**0.537**