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# Highest PIR System

Nonflammable Panel Solution

Continuous Panel

Discontinuous Panel



**TOPCO** *Global Ltd.*

# Certification of fire-resistant urethane Highest PIR

## FM (Factory Mutual certification)

- FM Approvals offers worldwide certification and testing and analyzing services of industrial and commercial loss prevention products, a subsidiary of FM Global, American insurer. Most US and European companies of construction panels obtained the FM Approvals. With this FM approval, the factory buildings in the US have the benefit of decreasing insurance cost by 60%.
- All FM-approved panels, first in Korea!! (2012.3.26)
- Finetech Co., Ltd. ▶ FM 4471 (roof materials)/4880(interior Wall)/4881 (exterior wall)



Document	Issue or Revision	Description
Surveillance Audit Manual for Finetec Corp building panels	March, 2012	audit manual
Surveillance Audit Manual for Finetec Corp building panel core-Aekyung Petrochemical	March, 2012	audit manual

# Certification of fire-resistant urethane Highest PIR

## Quasi-Noncombustible(Noncombustible grade 2)



- Quasi-Noncombustible Test Standard : heating for 10 minutes / released calorie under 8MJ/ m<sup>2</sup>  
Under released gas the testing rodent's behavior must stand still for over 9 minutes.
- Beaver Co., Ltd. / Samsung Indus Co., Ltd. /Mpanel Co., Ltd. /Hankook Panel Co., Ltd. / Finetech Co., Ltd. / SYTech Co., Ltd.  
<Korea Conformity Laboratories>

## Noncombustible grade 3















- Noncombustible Test standard: heating for 5 minutes/ released calorie under 8MJ/m<sup>2</sup>  
Under released gas the testing rodent's behavior must stand still for over 9 minutes.
- Beaver Co., Ltd. /Samsung Indus Co., Ltd. /Mpanel Co., Ltd. /Hankook Panel Co., Ltd. / Finetech Co., Ltd. / SY Tech Co., Ltd.  
<Korea Conformity Laboratories>

# Highest PIR is fire-resistant urethane

## Fire-resistance test by materials

Test condition: 50-mm thick materials heated by torch for 3 minutes (commercial EPS is excluded since it is melted in contact with heat)

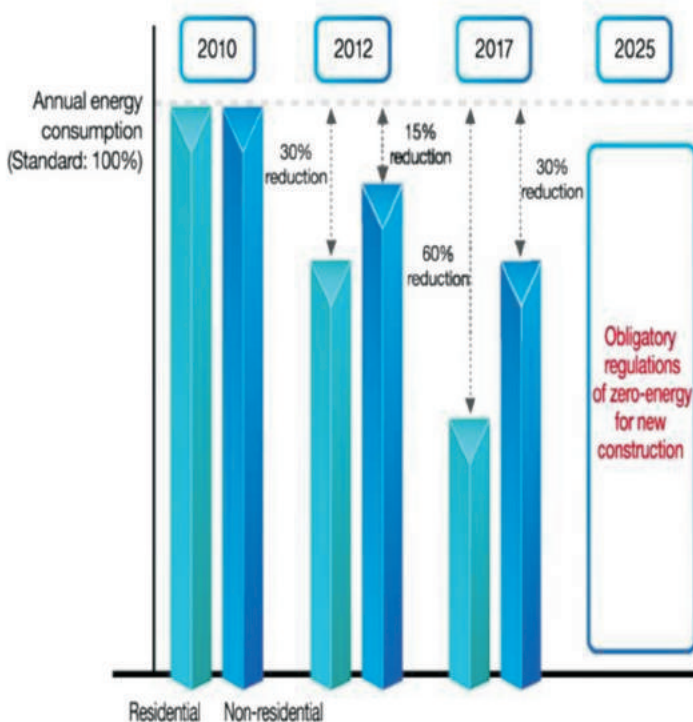
	Prior test	Heating	Results
<b>Fire-resistant urethane Highest PIR</b>			 <p>Just scorched. Maintain its original form after 10 minutes</p>
<b>Flammable urethane PUR</b>			 <p>Make holes after 1 minute 30 seconds</p>
<b>Glass wool (64K)</b>			 <p>Make holes after 1 minute 30 seconds</p>
<b>Noncombustible EPS</b>			 <p>Make holes after 15 seconds</p>

# Insulation performance of fire-resistant urethane Highest PIR

**“Increasing insulation performance and saving energy is the first step to low-carbon green growth”**

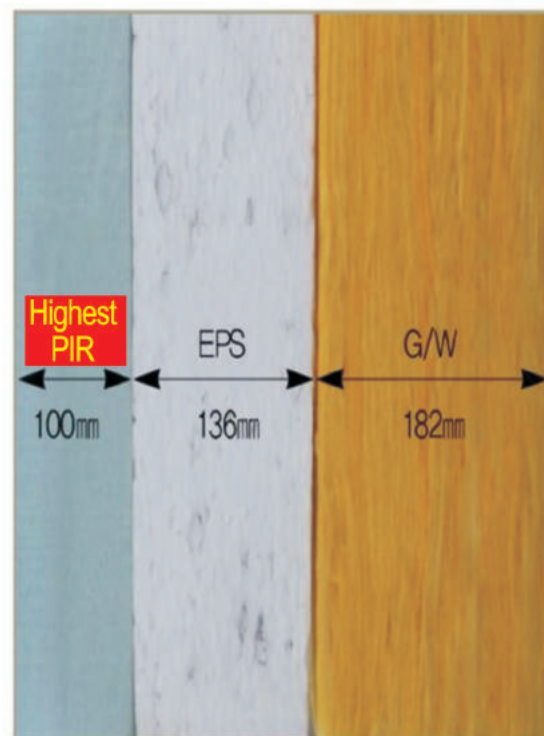
Fire-resistant urethane Highest PIR with excellent insulation performance is the best way to contribute to the Government's zero-energy house policy with wide application to most construction works by its less thickness than other materials.

## Guidelines of Government's Zero-Energy House Policy



Goals of Energy Consumption Meter-Rate System in Korea  
(Data released by Presidential Committee of Green Growth)

## Comparison of thickness based on Passive House (overall heat transmission ratio $0.15W/m^2K$ )



※ Passive house ► energy-saving insulating house

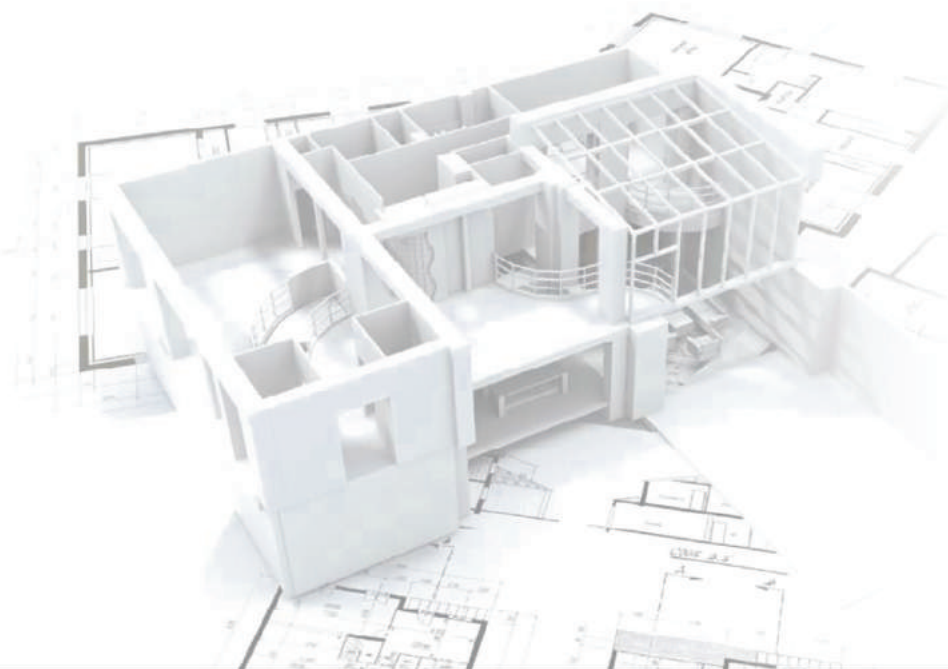
# Insulation performance of fire-resistant urethane Highest PIR

## Insulation performance comparison by materials

Division	Highest PIR	EPS(Styrofoam)	Glass Wool	Remarks
Heat conductivity(W/mK)	0.022	0.030	0.040	
Heat transmission ratio/roof(W/m <sup>2</sup> K)	0.398	0.563	0.722	
Heat transmission ratio/wall(W/m <sup>2</sup> K)	0.397	0.558	0.714	
Heat loss coefficient (W/mK)	1,916	2,705	3,466	Structure of 100m in width, 30m in length and 7m in height
Heat loss (kcal/day)	791,040	1,116,480	1,430,880	Inside/outside Temperature difference: 30 ℃ Daily 16-hour heating
Fuel consumption(ℓ/day)	86	122	156	Caloric value 9,200 kcal/ℓ Use of diesel
Fuel cost(₩/day)	159,100	225,700	288,600	₩1,850/ℓ Based on March, 2012
Comparative cost effect	100%	142%	182%	

■ This example was resulted from comparative heating load to roof and wall only.

⇒The application of **Highest PIR** panel generates more energy-saving effect than EPS panel by 30% and GW panel by 45%.



# Application of fire-resistant urethane Highest PIR

**“Wide application of fire-resistant urethane Highest PIR in our daily life”**



# Application of fire-resistant urethane Highest PIR

## Highest PIR form properties

Item	Unit	Value	Test Method
Core Density	Kg/m <sup>3</sup>	44 ~ 46	KSM 3809
Absorption	g/100cm <sup>2</sup>	0.4	KSM 3809
Heat conductivity (Average temperature 20 ±5℃)	W/m.K	0.019	KSM 3809
Flexural strength (bending strength)	kgf/cm <sup>2</sup>	3.0 ~ 3.7	KSM 3809
Compressive strength			
Vertical		1.4~1.6	ASTM D-1621
Horizontal	kgf/cm <sup>2</sup>	2.8~3.7	
Average		2.1~2.7	
Dimensional stability			
-30℃, 24hr	ΔV%	-0.29	ASTM D-2126
70℃, 24hr		0.63	
Flame-resistance		Fire-resistance (30 minutes) / Quasi-noncombustible / flame-resistant	ISO 5660-1, KS F 2271





# Highest PIR - related press release

## Highest PIR form properties

### Innovative Fire-resistant Construction Materials Highest PIR

Aekyung Petrochemical has developed the innovative fireproof construction materials.

Last 15, May 2012, Aekyung Petrochemical announced the fireproof organic materials 'AK PIR' of more 70% heat insulation property than conventional ones.

'AK PIR' has been first accredited as the fireproof structure in Korea by the KICT (Korea Institute of Construction Technology). This development of new materials enables us to produce the energy-saving and fire-resistant panels for construction. Conventionally, EPS (Styrofoam or Expanded Polystyrene foam), PUR (Polyurethane) or glass fibers have been adopted for interior and exterior finishing materials for buildings. But, EPS and PUR cannot overcome inflammability, while glass fibers are comparatively flame-resistant but has disadvantage of thickness in construction work. On the contrary, AK PIR has highly fire-resistance and it is just scotched when direct heat is applied by a torch, explained Aekyung Petrochemical.

Maeil Business Newspaper (2011.3.16)



◁그라스울 & PIR 비교테스트



◁그라스울 테스트(5분 경과)



◁PIR폼 테스트(10분 경과)

### Highest PIR has changed the market of Glass wool panel. Adoption in new construction site of Busan BEXCO

Last 29 May, 2012 in Hyundai Construction's laboratory in Busan BEXCO construction site, the comparative fire-resistance test of AK PIR foam and glass wool has been executed. This comparative test was for identifying the possibility of substituting the glass wool metal that was adopted as exterior panels in the Finetech's original design by AK PIR foams of Aekyung Petrochemical, and went off in the

attendances of around 30 persons of the inspection company (Junglim Architecture) and concerned Hyundai Construction, Aekyung Petrochemical and Finetech. The test lasted for about 30 minutes and showed a surprising result of fire-resistance of AK PIR. The tested glass wool became pitted in 5 minutes while AK PIR had no holes after 10 minutes in this test.

Consequently AK PIR's excellent

property has completely replaced about 800m<sup>2</sup> of glass wool metal (800 million Won) of Finetech's design by AK PIR.

Aekyung Petrochemical AK PIR has been first accredited as the organic fire-resistant materials in Korea last February, 2012.

### US FM-approved Construction Panels

#### "Expansion of Sales Capacity"

Finetech's construction panels have been first approved by the US FM.

Finetech, an affiliate company of construction materials of Dongsung Holdings announced that it obtained 'FM Approvals' in technology and performance from a worldwide certificate authority FM Global in entire sector of construction panels.

Mr. Park, Won-Se, representative director said that the company's sales capacity would be strengthened and expanded with this across-the-board approvals against other companies with FM approvals in interior panels. In taking this opportunity, Finetech will not only focus on local market but also concentrate its main force on development of overseas market. In particular, the adoption of FM-approved products will bring benefits in reducing

insurance costs and then will considerably respond to recently increasing demand in Asian countries.

This approval covers the fire safety of interior panels and fire-resistant exterior structures.

FM Approvals is a representative worldwide certification authority for construction materials, as a subsidiary of FM Global, a worldwide insurer. Actually, most construction panel manufacturers in the US and Europe obtains the FM Approvals. Aekyung Petrochemical's 'AK PIR' also obtains the FM certification this time. 'AK PIR' is the organic fire-resistant materials with excellent fireproof and insulation properties through Mpanel Co., Kr, first approved in last February by the KICT (Korea Institute of Construction Technology).

### Manufacturer of Urethane Panels in 2011

PIR → Fireproof Urethane Panel / PUR → Inflammable Urethane Panel

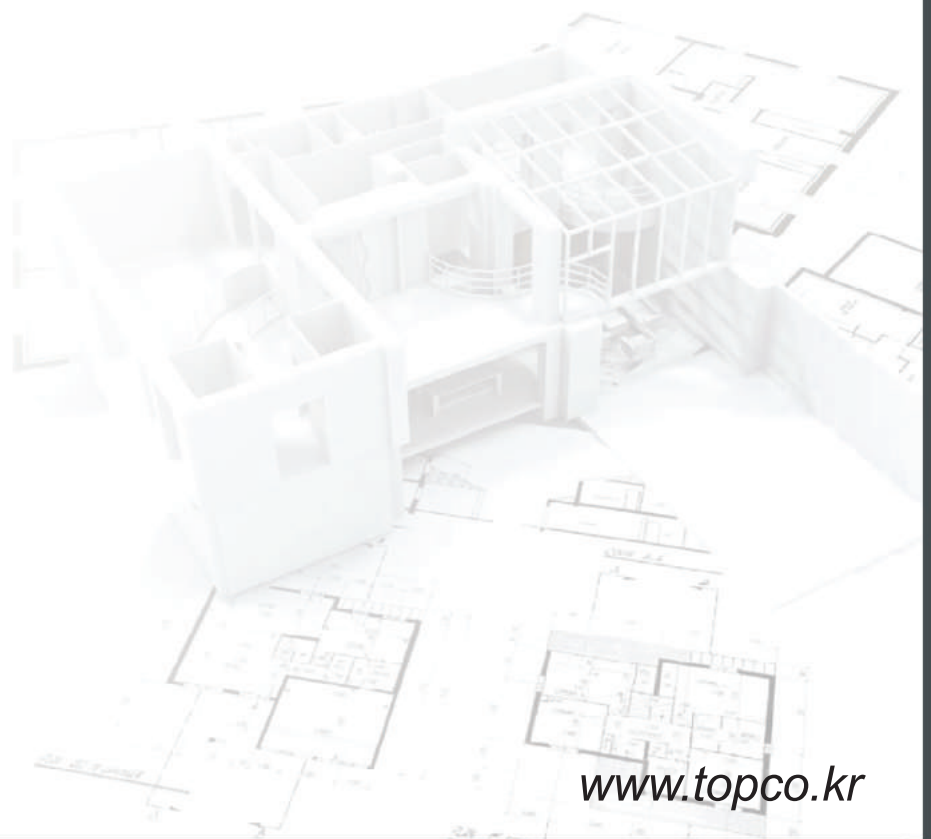
	Company name	PIR	PUR	Total
1	SY	630	850	1,480
2	Mpanel Co., Ltd. [Jecheon, Cheongbuk]	1,410	30	1,440
3	Dongyang Panel [Yangju, Asan]	290	1,060	1,350
4	Younggong [Namyangju, Daegu]	850	470	1,320
5	Dongcheon	510	620	1,130
6	Girin Industrial Co., Ltd.	1,050	50	1,100
7	Sinwoo Industrial Co., Ltd.	660	380	1,040
8	Eoktae Industrial Co., Ltd.	40	980	1,020
9	Finetech	840	70	910
10	Younghwa	480	300	780
11	Deokyu Panel	140	340	480
12	Hankook Panel	350	80	430
13	Samsung Indus	270	30	300
	Total	7,530	5,260	12,790

※ Polyurethane World 2011.10.5/2012.3.5/2012.4.5 · Maeil Business Newspaper 2011.3.16 · Seoul Economics 2012.3.28

※ Fire-resistant Urethane : product graded as over 3 in incombustibility test



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