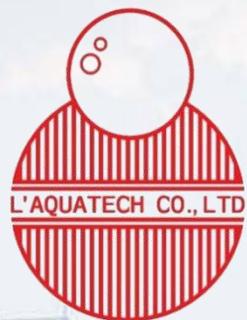


# บริษัท ลากัวร์เทค จำกัด



49/7 หมู่ 9 ต.บางม่วง อ.บางใหญ่ จ.นนทบุรี 11140 , โทร.02-443-7300 ext.411 email: [sirikhwan@laquatech.com](mailto:sirikhwan@laquatech.com)



**What's the definition of INSULATION?**



# INSULATION ORGANIZATION



**NAIMA**  
NORTH AMERICAN INSULATION  
MANUFACTURERS ASSOCIATION



***RIMA*** *International*  
Reflective Insulation Manufacturers Association International



Center for the  
Polyurethanes Industry



Asian Reflective Foil Association

# World standard for thermal Insulation



# Contents

- General Background for insulation
- Bubble Foils Insulation concept
- Performance tests and certificates
- Installation
- Site references
- Conclusion





# Methods of HEAT TRANSFER

Convection

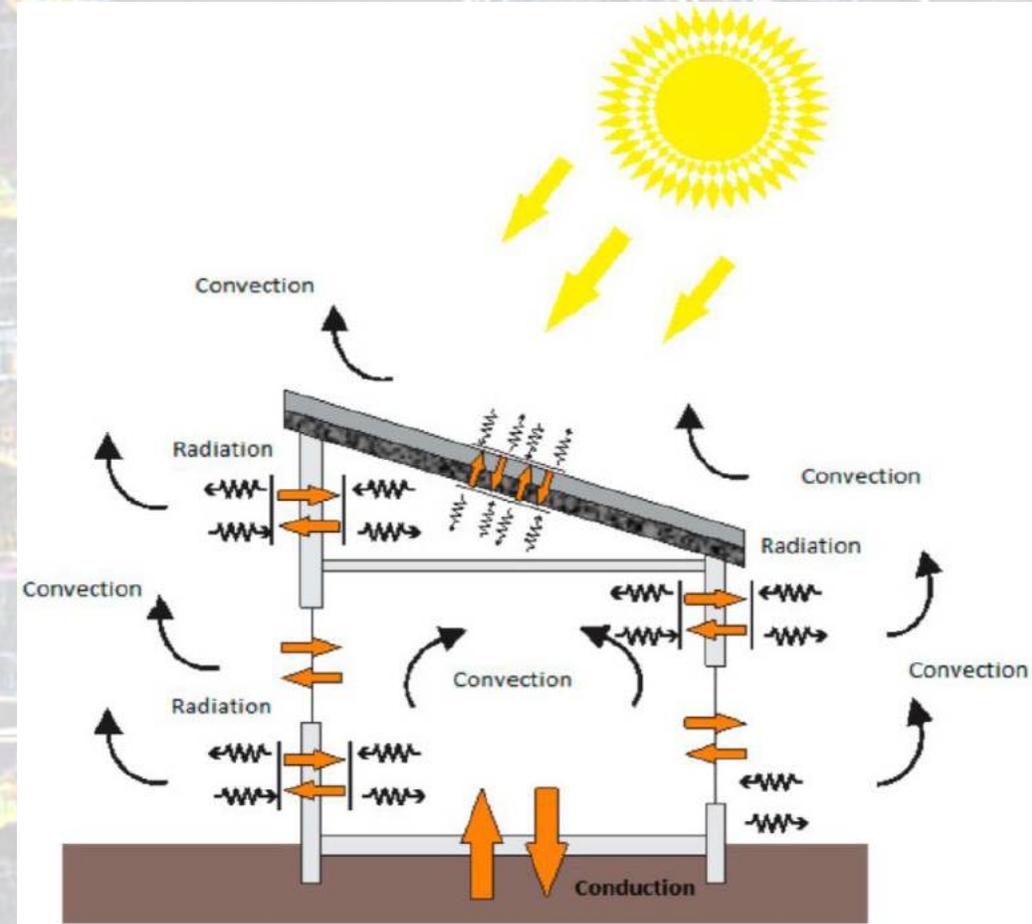
Conduction

Radiation



Heat transfer describes the flow of heat (thermal energy) due to temperature differences and the subsequent temperature distribution and changes.

# HEAT TRANSFER ON BUILDING ENVELOPE



Traditional method for getting hot water



New method for getting hot water



=

**R - Value**



Thickness  
Density



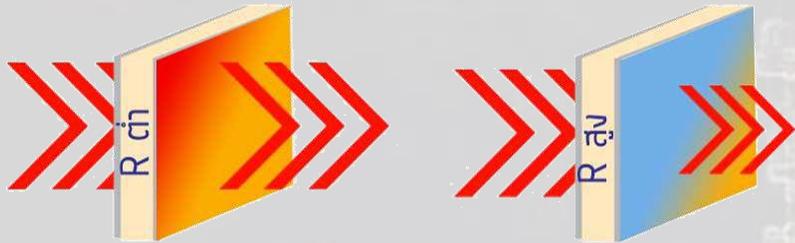
Low E Material

# Thermal value of Traditional Insulation

**R value** ค่าความต้านทานความร้อน (Thermal Resistance ; R value)

คือ ค่าที่บอกความสามารถของวัสดุในการยับยั้งการไหล หรือถ่ายเทความร้อน โดยขึ้นอยู่กับความหนาและค่า k ของวัสดุนั้นๆด้วย มีหน่วยเป็น m<sup>2</sup>K/W

ยิ่งมาก ยิ่งดี (สำหรับฉนวน)

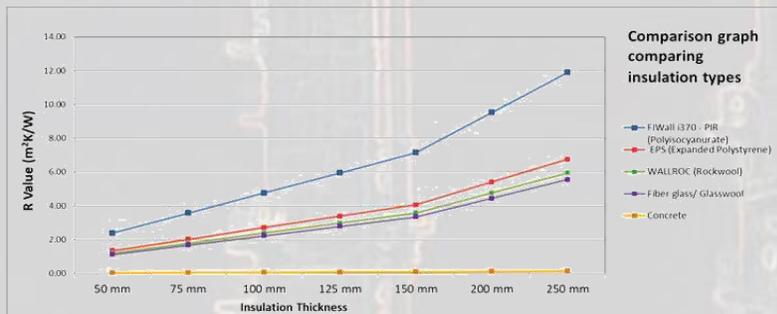


**U value** ค่าสัมประสิทธิ์การถ่ายเทความร้อน (Heat transfer coefficient ; U value)

คือ ปริมาณความร้อนที่ไหลผ่านเข้ามาในส่วหนึ่งของอาคารตงที โดยที่อุณหภูมิอากาศของทั้งสองด้านแตกต่างกัน (ส่วนกลับของค่าความต้านทานความร้อน)

ขึ้นกับความหนาและค่า k ของวัสดุนั้นๆด้วย มีหน่วยเป็น W/m<sup>2</sup>K

ยิ่งน้อย ยิ่งดี (สำหรับฉนวน)



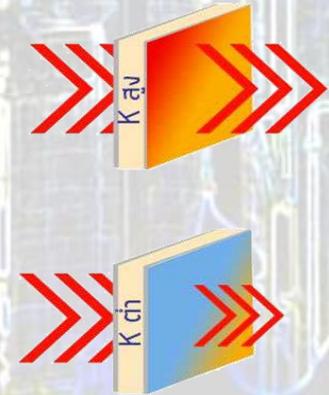
หาได้จาก  $U = \frac{1}{\text{Thermal Resistance ; R value}}$

**K value** ค่าการนำความร้อน (Thermal Conductivity; K value)

คือ ค่าคงที่เฉพาะตัวของวัสดุต่างๆ ที่บ่งบอกความสามารถในการยอมให้ความร้อนไหลผ่านตัวเองได้เท่าไร มีหน่วยเป็น W/mK ยิ่งน้อย ยิ่งดี (สำหรับฉนวน)

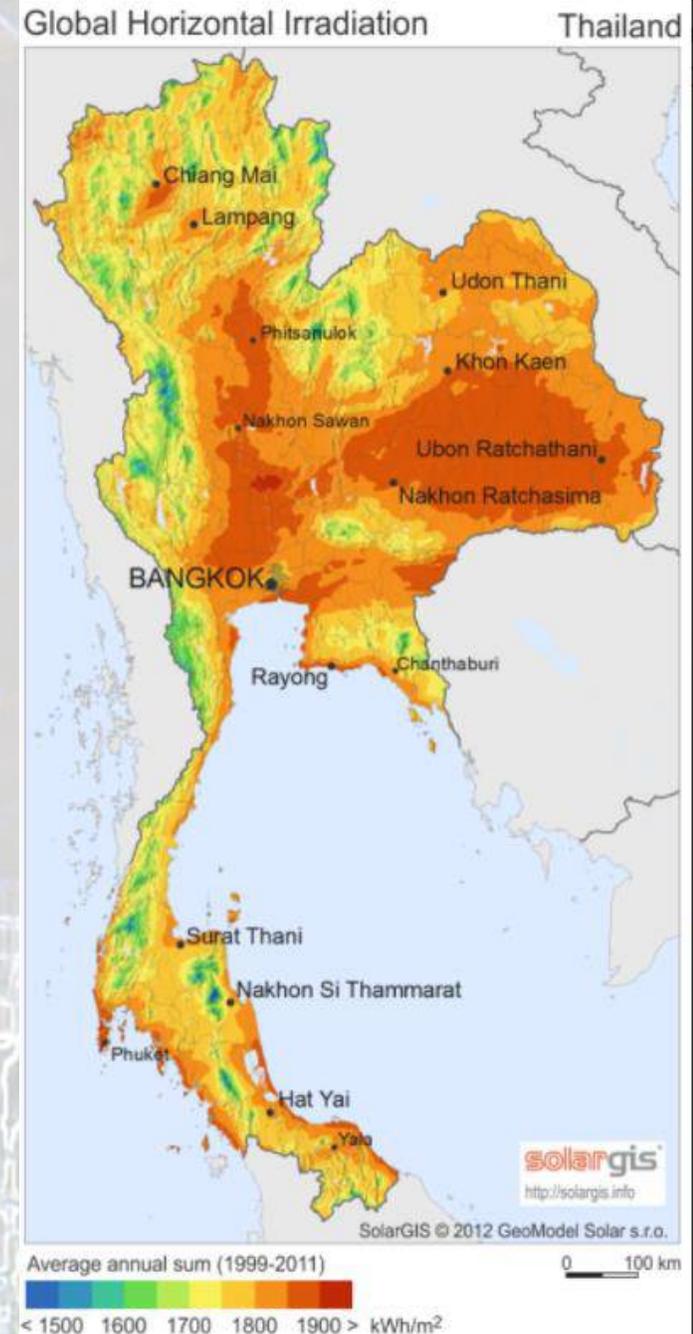
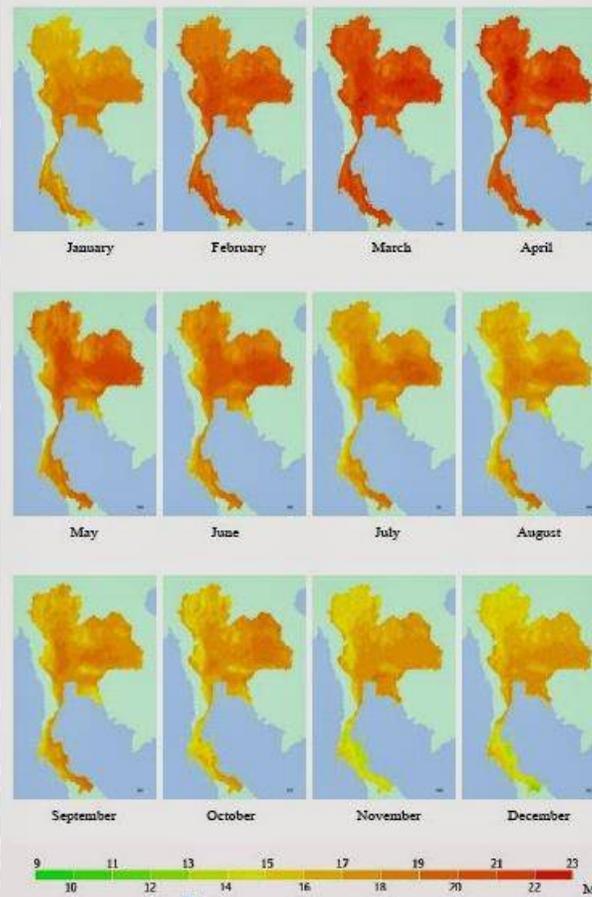
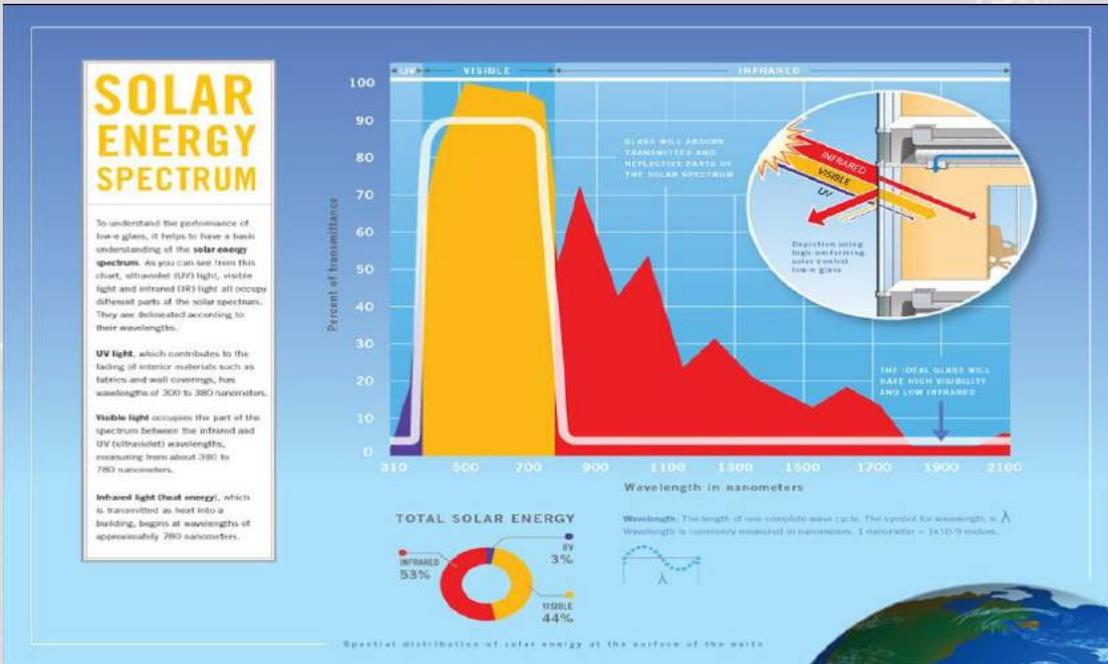
Thermal conductivity (K)	W/mK
Polyisocyanurate (PIR) *	0.0213
Polystyrene (PS) *	0.0274
Rock Wool (RW) *	0.0334
Fiber glass/ Glasswool	0.05
Brick	0.69
Concrete	1.73

\* WTG Products



Material	Thermal Conductivity (W m <sup>-1</sup> K <sup>-1</sup> )
Carbon Nanotubes	2000 [7]
Diamond	900 – 2320 [17]
SiC	490 [2]
Silver	424 [2]
Copper	398 [2]
Gold	315 [2]
Aluminum	273 [2]
Graphite	119 – 165 [7]
Iron	80 [2]
Cupric Oxide	77 [18]

The major heat source come from the SUN.  
 The solar energy are playing the big role in Thailand.



# Bubble Foils concept of blocking heat

# E

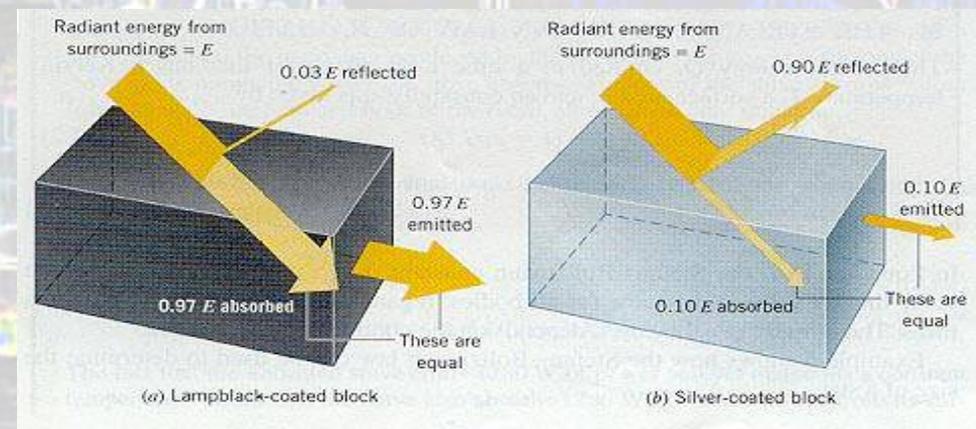
VALUE ค่าสัมประสิทธิ์การแผ่รังสีความร้อน(emissivity,  $\epsilon$ ) เป็นค่าที่แสดงถึงความสามารถในการ

แผ่รังสีความร้อน (thermal radiation) ของวัตถุที่อุณหภูมิใดๆ หรือค่าอัตราส่วนของพลังงานการแผ่รังสีความร้อน (emissive power) ของวัตถุใดๆ และพลังงานการแผ่รังสีความร้อนของวัตถุดำ ณ อุณหภูมิเดียวกัน

ยิ่งน้อย ยิ่งดี

ตารางแสดงค่าความสามารถในการแผ่รังสีความร้อน ( $\epsilon$ ) ของพื้นผิววัสดุบางชนิด

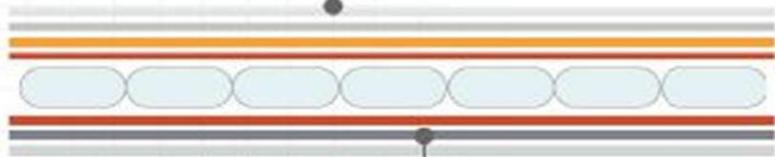
Material's Surface	Wavelength ( $\lambda$ : $\mu\text{m}$ )	Temperature (K)	Emissivity ( $\epsilon$ )	References
Aluminum; Oxidized		273-373	0.11	Fraden, 2010
Aluminum; Polished		273-373	0.05	Fraden, 2010
Aluminum; Rough		273-373	0.06-0.07	Fraden, 2010
Brass; Oxidized	9.3		0.61	Rao, 2010
Brass; Polished	5.4 - 9.3		0.10	Rao, 2010
Copper; Oxidized		298	0.78	Fogiel, 1992
Copper; Polished		390	0.023	Fogiel, 1992
Iron; Cast, Oxidized	3.6 - 9.3		0.63 - 0.76	Rao, 2010
Iron; Oxidized	9.3		0.96	Rao, 2010
Iron; Polished	3.6 - 9.3		0.06 - 0.13	Rao, 2010
Stainless Steel; Types 304		489	0.44	Fogiel, 1992



# Radiation

- The lower the **emissivity** the lower the radiant heat given off to the next object (or air for that matter).
- Few materials in nature possess low **emissivity** properties: Gold, Silver, Copper and Aluminum (pure) foils.
- Low **emissivity** materials such as Aluminum foil, emits only 3% of incoming radiant heat. It means that 97% of such heat won't be radiated forward, rather will remain at surface level ("reflected away").

◆ HR = Anti-corrosion treatment



◆ High purity low-e Aluminium facing







Irish Standard  
I.S. EN ISO 6946:2017

Building components and building elements -  
Thermal resistance and thermal  
transmittance - Calculation methods (ISO  
6946:2017)



ASTM C910-21  
Standard Test Method for Steady-State Thermal  
Transmission Properties by Means of the Heat Flow  
Meter Apparatus

Conduct the test  
in Laboratory

Calculation of R & U value under typical metal GI sheet roof

Comparison between Polymer Thermal Insulation Standards (1) & (2) Fig. 9.96 Glass-Glass Panel  
Using One Layer 75mm profile with other 45mm below

Parameters	No Insulation		Polystyrene 9.0mm		Control 45mm (1) Glass		Glass Glass Wool 21 kg/m <sup>3</sup>	
	Thickness (A)	R Value	Thickness (A)	R Value	Thickness (A)	R Value	Thickness (A)	R Value
1. Inside Air Film		0.08		0.08		0.08		0.08
2. Metal GI sheet and fixings and external surface		0.01		0.01		0.01		0.01
3. Layer of Glass (Upper and lower 9mm)		-		0.23		0.23		0.23
4. Air Gaps (between insulation)		-		0.13		0.13		0.13
5. Layer of Glass (lower 9mm)		-		0.13		0.13		0.13
6. Glass Glass Wool 21 kg/m <sup>3</sup>		-		1.44		1.44		1.44
7. Outside Air Film		0.16		0.16		0.16		0.16
<b>R Value total (R)</b>		0.25		2.05		2.29		2.05
<b>U Value total (U) (W/m<sup>2</sup>·K)</b>		4.00		0.49		0.44		0.49
<b>U Value (U) (W/m<sup>2</sup>·K)</b>		4.00		0.49		0.44		0.49

R (Thermal Resistance) m<sup>2</sup>·K/W  
U (Thermal Transmittance) W/m<sup>2</sup>·K

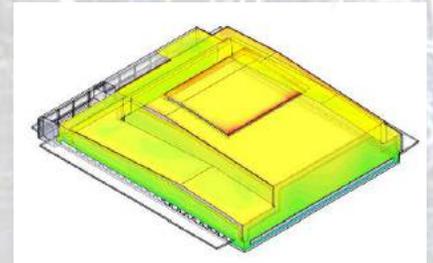
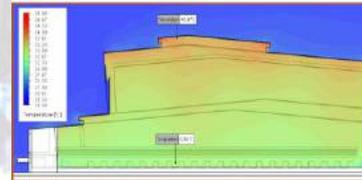
\* Height assembly constant = 0.25  
\*\* Depth assembly constant = 0.25  
† In Accordance with ASHRAE 2011 Fundamentals Handbook Chapter 25 (SI Units)



Calculation  
Method

### Computational Fluid Dynamics Analysis Topic

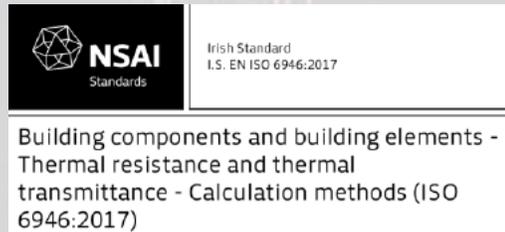
Temperature Analysis  
Temperature contour section plane (East) for Metal sheet with  
Polysield 9 mm.



Simulation and  
Mock-up

# Base on the 20 years experience in Thailand and more than 30 years in other countries

we are proudly to proof that our products comply to safety building standards, environmental friendly, and energy efficiency in buildings



# Case install insulation more than 15 years in Thailand Lotus's RAMA1

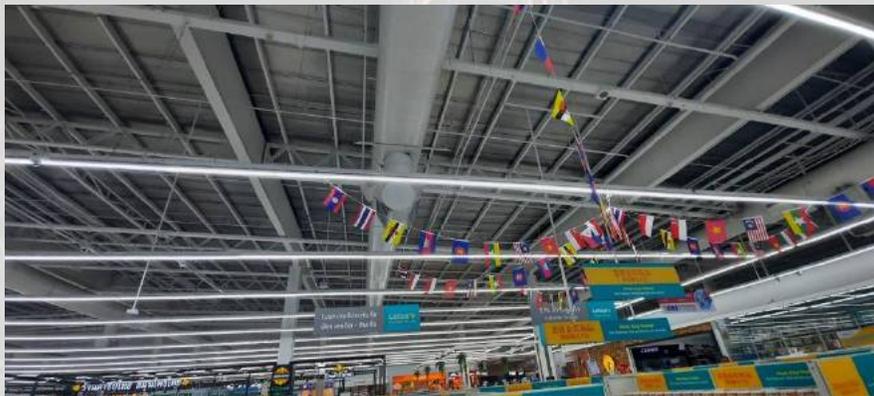


Photo: 2/3/2024

Still in good condition with no any damage, look nice and bright

# Passed ASTM C518 : Thermal performance testing



Kompleks Penyelidikan, Lingkungan 2, Universiti Kebangsaan  
Malaysia, 43600 Bangi, Selangor.

Phone: 8911 8584  
Fax: 8911 8574

## Thermal Resistance Test Report

Date of Test: April 9, 2015

Manufacture: Poly Protech (Thailand)

Test Number: HFM 015/2015

Description of Test Specimen: Polyshield Select 80 FR NET with 50mm air gap top & bottom;  
Reflective Insulation. Test Method: ISO 8301/ASTM C518. "Test Method for Steady-State Thermal  
Transmission Properties by Means of the Heat Flow Meter Apparatus."

Report Prepared For: Terreal Malaysia Sdn Bhd / Mr. Ivan Loo

The results in this report were obtained with a heat-flow meter built and operated in accordance  
with ISO 8301 / ASTM C518.

Heat flow meter: 600 by 600 mm. by mm.  
Specimen thickness: 8.0mm mm  
Specimen density: NA kg/m<sup>3</sup>  
Air gap: 50mm (top); 50mm (bottom)

Hot plate temperature: 35 (Upper plate) °C  
Cold plate temperature: 20 (Bottom plate) °C  
Average specimen temperature: 27.52 °C  
Heat flow direction: Downwards

Apparent thermal conductivity: 0.04572 W/m.K  
Thermal resistance of specimen: 2.3622 K.m<sup>2</sup>/W

Notes: Calibration factor used for manual calculation? NA  
Edge guards or cabinet temperature satisfactory? Yes  
Excessive moisture on cold plate? No  
Length of time for test (hours) 2 hrs and 48 mins.  
The precision of this test is estimated to be 2% (Section 10.8, ASTM C 518-04)

  
Reviewed By: \_\_\_\_\_

6-4-2015  
Date: \_\_\_\_\_

The results in this report apply only to the specimen tested. This test conforms to ASTM Test Method C  
518-04 except for the report requirements.



**KING MONGKUT'S UNIVERSITY OF TECHNOLOGY THONBURI**  
INSTITUTE FOR SCIENTIFIC AND TECHNOLOGICAL RESEARCH AND SERVICES  
126 PRACHA-U-THIT RD., BANGMOD, THUNGKRU, BANGKOK 10140 THAILAND  
Tel. +66 2470-9671-3, +66 2470-9664-7 Fax +66 2428-3374 <http://www.kmutt.ac.th>

Our ref : ISTRS/61436

JULY 25, 2018

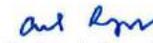
Manager : Poly Protech Company Limited  
Subject : Report of testing the chemical properties of the specimens "POLYSHIELD PE  
BIG FR" One piece of sample.

The Institute for Scientific and Technological Research and Services, King Mongkut's  
University of Technology Thonburi has finished testing the chemical properties of the  
specimens "POLYSHIELD PE BIG FR" One piece of sample. The stand test method are as the  
TISI 1384 – 2548. Results are as the following:-

Item No.	Parameter	Unit	Results
1	Density	Kg/m <sup>3</sup>	39.7
2	Thermal conductivity (K) at 27±1 °C	W/m-K	0.0340
3	Water vapour (moisture) permeability (µ)	-	2.53x10 <sup>-5</sup>
4	Water absorption 4 days volume changed	%	
5	Dimensional stability at 70±2 °C 22, sheet		
	- Width	%	+0.33
	- length	%	+0.33
6	Flammability		
	- Vertical Position	cm/min	29.5
	- Horizontal Position	mm/min	130.0

Very truly yours,

  
(Mr.Ounsa Nonphala)  
Analyst/ Laboratory Manager

  
(Assoc. Prof. Anek Siripanchgorn)  
Director Institute of Scientific and  
Technological Research and service

# INSULATION Calculation

## Calculation of R & U value under typical metal GI sheet roof

Comparison between Polynshield Thermal Reflective Insulation to EPDM insulation

Using Lysaght V700 profile with shallow clip lock rows

		No Insulation		Polyshiled BIG 80 FR: 9mm		10 mm: EPDM insulation one side foil	
Parameters		R Value		R Value		R Value	
1	Outside Air Film	0.06		0.06		0.06	
2	Lysaght Clip Lock metal roof sheet system	≈0		≈0		≈0	
3	Low E facing Upper <b>Average Air Gap</b> 14.3 mm.			E=0.03*	0.44		
4	Air Bubbles heat resistance contribution			0.009/0.035	0.26		
5	EPDM Contribution					0.01/0.035	0.29
6	Low E facing lower <b>Average Air Gap</b> 90mm			E=0.03*	1.77	E=0.03*	1.77
8	Internal air film (fixed)	0.16					
<b>R Value total, Rt</b>		<b>0.06</b>		<b>2.53</b>		<b>2.12</b>	
<b>U Value = 1 / Rt</b>		<b>16.67</b>		<b>0.40</b>		<b>0.47</b>	
<b>Effective R Value total, Ret</b>		<b>0.04</b>		<b>2.53</b>		<b>1.48</b>	
<b>Effective U Value = 1 / Ret</b>		<b>23.81</b>		<b>0.40</b>		<b>0.68</b>	
<b>Finish Look: Internal View</b>		<b>Same as roof color (silver)</b>		<b>Silver Shiny</b>		<b>Silver Shiny</b>	

R (Thermal Resistance); m<sup>2</sup>.k/W

U (Thermal Transmittance) ; W/m<sup>2</sup>.k

\* วัสดุค่า emissivity constant = 0.03 อ้างอิงการคำนวณจากมาตรฐาน ASHRAE 2001: Fundamental Handbook- Chapter 25 (Table3) ทดสอบที่อุณหภูมิ 32.2°C

\*\* EPDM K value was done in 0C to 24C, with mean value of 12C. Polyshield K value based on real life temperature with mean temperature of 27C. The lower the temperature used for K, the better the K, but it is not applicable to Thai conditions.

\*\*\* ตาราง ASHRAE มี Air space อ้างอิงที่ 13mm Air gap จึงใช้ค่า 13 mm

# SITE TEST:

Bangchan Assembly temperature test after 2year  
(After service), >60,000sqm.

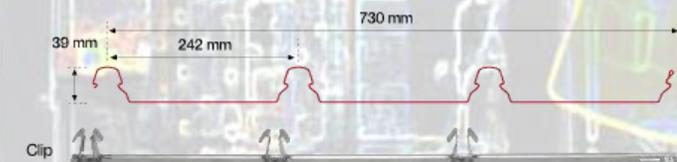


ลักษณะอาคาร ศูนย์เตรียมรถยนต์ใหม่ บริษัท บางชันเฮนเนอเวลเอเซมบลี จำกัด  
อาคาร VPC-5 Parking B ความสูงอาคารมากกว่า 8-10 เมตร

- Model TH Clip Lock Optima 730 Model
- Connector type: สูง 43mm.



## Sectional Profile



## Lengths

On site roll-forming from ridge to eave, i.e. single jointless sheet or custom cut

## Tolerances

Thickness for Material :  $\pm 0.03\text{mm}$   
Effective Width :  $\pm 4\text{mm}$   
Length :  $\pm 0-15\text{mm}$

## Dimension

Rib Height : 39mm  
Effective Cover : 730mm  
Minimum Roof Pitch : 1°

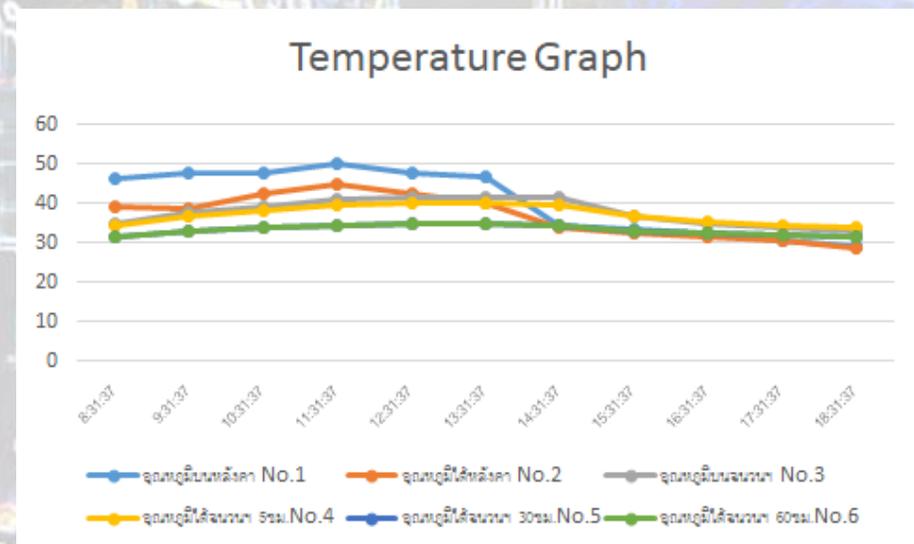
# SITE TEST: RESULT



ภูมิอากาศตามกรมอุตุนิยมวิทยา

MAX: 34 MIN: 27

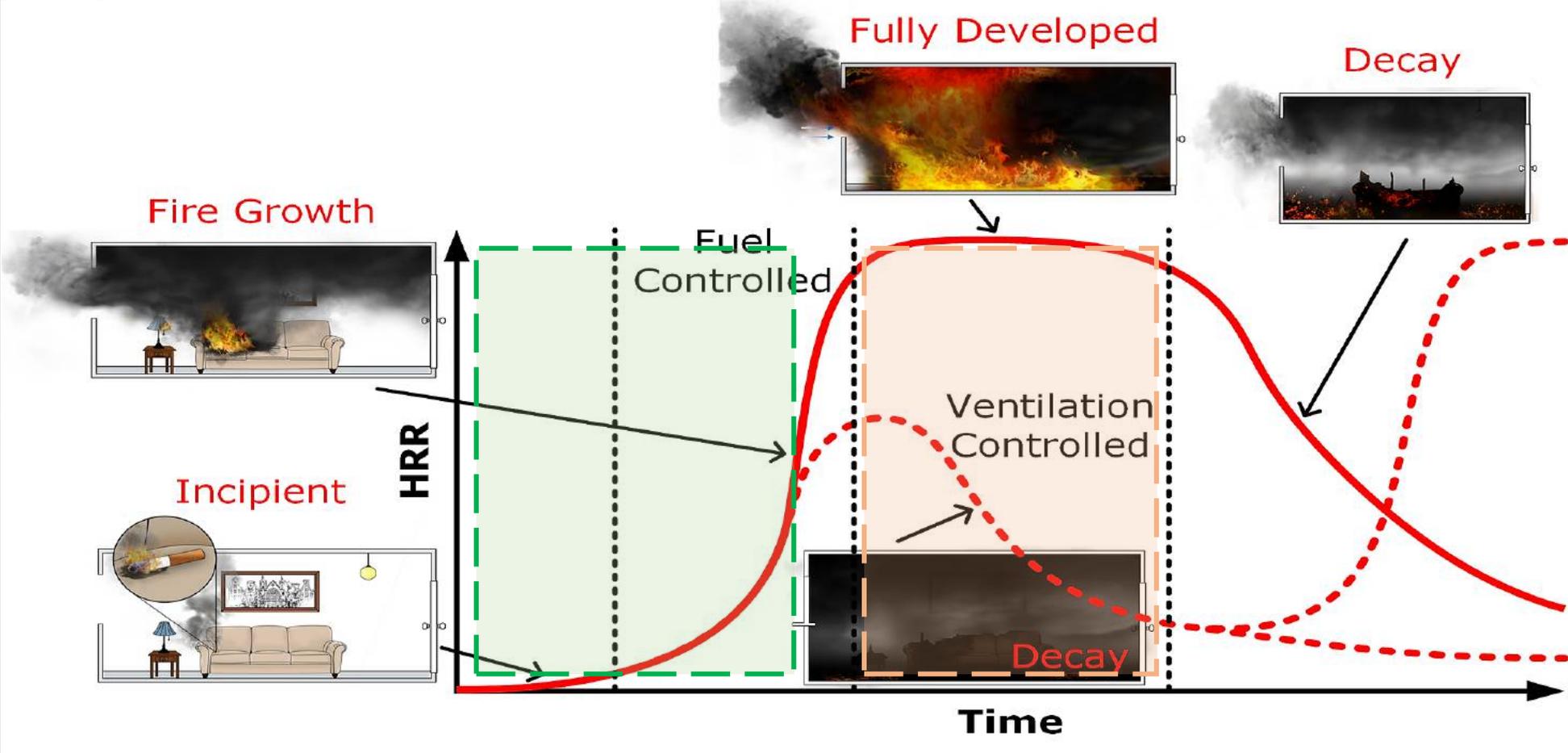
เวลา/ อุณหภูมิ	อุณหภูมิบน หลังคา No.1	อุณหภูมิใต้ หลังคา No.2	อุณหภูมิบน ฉนวนฯ No.3	อุณหภูมิใต้ ฉนวนฯ 5ซม. No.4	อุณหภูมิใต้ ฉนวนฯ 30ซม. No.5	อุณหภูมิใต้ ฉนวนฯ 60ซม. No.6
8:31:37	46	39	35	34.5	31.25	31.5
9:31:37	47.5	38.5	37.5	36.75	32.75	32.75
10:31:37	47.5	42.25	39.25	38	33.75	33.75
11:31:37	50.25	45	41	39.5	34.25	34.25
12:31:37	47.5	42.5	41.5	40	34.75	34.75
13:31:37	46.5	40.25	41.5	40	34.75	34.75
14:31:37	34.5	33.75	41.5	39.75	34.25	34.25
15:31:37	33.25	32.25	36.5	36.75	32.75	32.75
16:31:37	32.25	31.5	35	35.25	32.25	32.25
17:31:37	30.5	30.5	34	34.5	31.75	32
18:31:37	29.25	28.75	32.75	33.75	31.5	31.5





# FIRE PREFORMANCE

# Fire graph behavior



**Reaction to Fire**

- Ignitability
- Heat emission
- Combustibility

**Reaction to Fire**

- Fire propagation
- Surface spread of flame
- Smoke development

**Resistance to Fire**

- Loadbearing capacity
- Integrity
- Insulation

**Other Considerations**

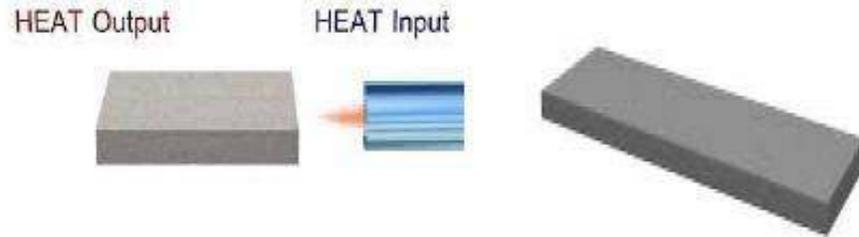
- Impact pressure
- Hose stream
- Radiant heat

# MATERIAL REACTION TO FIRE

**Part 4**  
REACTION TO 750°C

**Part 6**  
FIRE PROPAGATION

**Part 7**  
SURFACE SPREAD OF FLAME



Oven temperature:  
**750°C**

Specimen Maximum  
temperature rise **50°C**

Maximum permissible  
flaming **10 seconds**

Measures heat output

Lateral spread of flame  
along the surface of a  
specimen

Classes 1 – 7 based on the  
rate and extent of flame  
spread

Combines to obtain Class O

# REACTION TO FIRE

□ Testing standard for Material Characteristic (reaction to fire) accordance with to BS 476

<b>Part 4 to 11</b>	<b>Materials only</b>
<b>Part 4</b>	▪ Non combustibility
<b>Part 6</b>	▪ Fire propagation
<b>Part 7</b>	▪ Surface spread of flame
<b>Part 11</b>	▪ Heat emission
<b>Part 20 to 24</b>	<b>Fire resistance of complete constructions</b>

□BS EN ISO 1182 Non-combustibility testing Classification -BS EN 13501-1  
 □BS EN ISO 1716 Calorific potential test  
 □BS EN 13823 Single burning item  
 □BS EN 11925-2 Small flame ignitability

# REACTION TO FIRE CLASSIFICATION

EN 13501-1		BS 476	
Classification	Test Standards	Classification	Test Standards
Class A1	EN ISO 1182 + EN ISO 1716	Non-combustibility	BS 476 Part 4
Class A2	[EN ISO 1182 or EN ISO 1716] + EN 13823	Limited combustibility	BS 476 Part 11
Class B	EN 13823 + EN ISO 11925-2	Class 0	BS 476 Part 6 & 7
Class C	EN 13823 + EN ISO 11925-2	Class 1	BS 476 Part 7
Class C	EN 13823 + EN ISO 11925-2	Class 2	BS 476 Part 7
Class D	EN 13823 + EN ISO 11925-2	Class 3	BS 476 Part 7
Class F	EN ISO 11925-2	Class 4	BS 476 Part 7

# Acheive Fire Test on Building Material and Structures BS 476 Part 6 and 7 Class 0

**SIRIM QAS International Sdn. Bhd.**  
 No. 1, Persiaran Dato' Menteri, P.O.Box 7035, Seksyen 2, 40700 Shah Alam, Selangor Darul Ehsan,  
 MALAYSIA  
 Tel: 03-55446465  
 (Company No: 410334-X)

**IAC-MRA**  
 MS ISO/IEC 17025  
 TESTING  
 SAMM NO. 231

Fax: 03-55446454      http://www.sirim.my

**SIRIM QAS INTERNATIONAL**

**TEST REPORT**

<b>REPORT NO.:</b> 2016FE0143	<b>PAGE</b> 1
-------------------------------	---------------

This Test Report refers only to samples submitted by the applicant to SIRIM QAS International Sdn. Bhd. and tested by SIRIM QAS International Sdn. Bhd. This Test Report shall not be reproduced, except in full and shall not be used for any purpose by any means or forms (including but not limited to advertising purposes) without written approval from the Managing Director, SIRIM QAS International Sdn. Bhd. Please refer overleaf of Page 1 for Conditions Relating to the Use of Test Report.

**Applicant** : EDARAN PRESTASI SDN. BHD.  
 Lot 763-2A, Jalan Subang 4,  
 Kawasan Perusahaan Sg. Penaga,  
 47610 Subang,  
 Selangor Darul Ehsan.  
 (Attn: Mr. Ivan Loo)

**Manufacturer** : POLY PROTECH CO. LTD.  
 122/2 MOO 6, Bangprien Subdistrict,  
 Bangbo District, 10560 N/A,  
 Samut Prakan, Thailand.

**Product** : REFLECTIVE INSULATION BUILDING MATERIALS

**Reference Standard/ Method of Test** : BS 476: Part 6: 1989+A1:2009  
 Fire Test on Building Materials and Structures  
 Part 6: Method of Test for Fire Propagation for Products.

**Description of Test Specimen** : 6 pieces of Reflective Insulation Building Materials  
 Size of Specimen : 225mm x 225mm x 8.3mm (measured thickness)  
 Brand : POLYSHIELD™  
 Model : POLYSHIELD™ SELECT 80 FR  
 Type : BUBBLE BASE  
 Mass Per Unit Area : 0.300 kg/m²

Descriptions of sample as claimed by the submitter: Refer to page 2

The specimens were tested with the Aluminium Foil + Net face side exposed to the specified heating condition of the fire test.

The test specimens were sampled by Mrs. Nurruhudda Mahmud of Industrial & Consumer Certification Section (Fire Group), SIRIM QAS International Sdn. Bhd. on 03.11.2015. The test was requested through PP2 Form Ref. No. P5009742 dated 15.01.2016.

**Date Received** : 26.02.2016  
**Date of Test** : 24.03.2016  
**Job No / Ref No.** : J20161440105 /SQAS/FPS/15/1-5

Subindex i1	Subindex i2	Subindex i3	Fire Propagation Index (I)
4.5	3.0	0.5	8.0

**Issued Date** : 01 APR 2016

**Approved Signatories** :

  
**MUHAMMAD SAFUAN MUSA**  
 Testing Executive

  
**ROHAYA IBRAHIM**  
 Head  
 Fire Protection Section  
 Testing Services Department  
 SIRIM QAS International Sdn. Bhd.

**SIRIM QAS International Sdn. Bhd.**  
 No. 1, Persiaran Dato' Menteri, P.O.Box 7035, Seksyen 2, 40700 Shah Alam, Selangor Darul Ehsan,  
 MALAYSIA  
 Tel: 03-55446465  
 (Company No: 410334-X)

**IAC-MRA**  
 MS ISO/IEC 17025  
 TESTING  
 SAMM NO. 231

Fax: 03-55446454      http://www.sirim.my

**SIRIM QAS INTERNATIONAL**

**TEST REPORT**

<b>REPORT NO.:</b> 2016FE0144	<b>PAGE</b> 1
-------------------------------	---------------

This Test Report refers only to samples submitted by the applicant to SIRIM QAS International Sdn. Bhd. and tested by SIRIM QAS International Sdn. Bhd. This Test Report shall not be reproduced, except in full and shall not be used for any purpose by any means or forms (including but not limited to advertising purposes) without written approval from the Managing Director, SIRIM QAS International Sdn. Bhd. Please refer overleaf of Page 1 for Conditions Relating to the Use of Test Report.

**Applicant** : EDARAN PRESTASI SDN. BHD.  
 Lot 763-2A, Jalan Subang 4,  
 Kawasan Perusahaan Sg. Penaga,  
 47610 Subang,  
 Selangor Darul Ehsan.  
 (Attn: Mr. Ivan Loo)

**Manufacturer** : POLY PROTECH CO. LTD.  
 122/2 MOO 6, Bangprien Subdistrict,  
 Bangbo District, 10560 N/A,  
 Samut Prakan, Thailand.

**Product** : REFLECTIVE INSULATION BUILDING MATERIALS

**Reference Standard/ Method of Test** : BS 476: Part 7: 1997  
 Fire Test on Building Materials and Structures  
 Part 7: Surface Spread of Flame Test.

**Description of Test Specimen** : 9 pieces of Reflective Insulation Building Materials  
 Size of Specimen : 270mm x 885mm x 8.4mm (measured thickness)  
 Brand : POLYSHIELD™  
 Model : POLYSHIELD™ SELECT 80 FR  
 Type : BUBBLE BASE  
 Mass Per Unit Area : 0.300 kg/m²

Descriptions of sample as claimed by the submitter: Refer to page 2

The specimens were tested with the Aluminium Foil+ Net face side exposed to the specified heating condition of the fire test.

The test specimens were sampled by Mrs. Nurruhudda Mahmud of Industrial & Consumer Certification Section (Fire Group), SIRIM QAS International Sdn. Bhd. on 03.11.2015. The test was requested through PP2 Form Ref. No. P5009742 dated 15.01.2016.

**Date Received** : 26.02.2016  
**Date of Test** : 25.03.2016  
**Job No / Ref No.** : J20161440106 /SQAS/FPS/15/1-6

**Test Result** : **Classification of Surface Spread of Flame Test** : **Class 1**

**Issued Date** : 01 APR 2016

**Approved Signatories** :

  
**MUHAMMAD SAFUAN MUSA**  
 Testing Executive

  
**ROHAYA IBRAHIM**  
 Head  
 Fire Protection Section  
 Testing Services Department  
 SIRIM QAS International Sdn. Bhd.

\*\*\*Materials that conform to BS476 provides added assurance about the materials contributing to the overall safety of building occupants in the event of a fire.

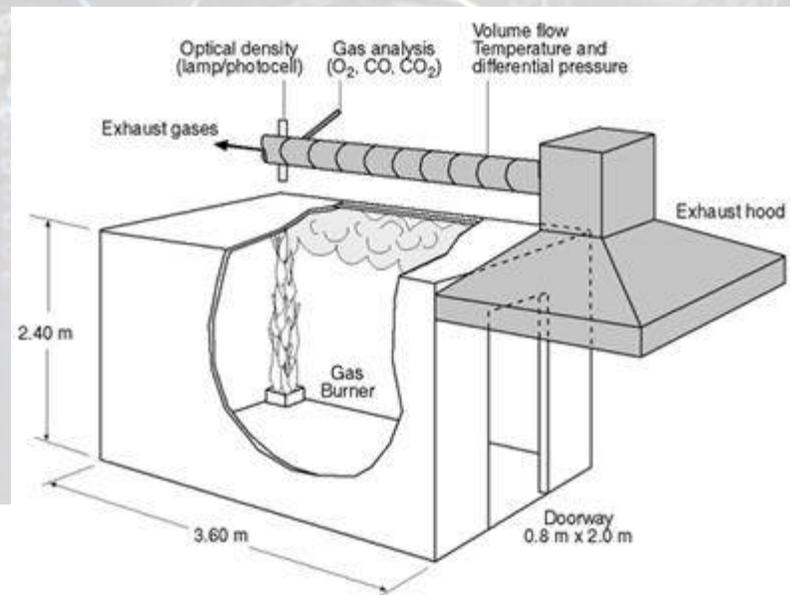
If Class 1 classification is required, look out for materials that have been tested according to BS 476 Part 7.

If Class 0 classification is required, the material must either:

- Be composed throughout of materials of limited combustibility, or
- Tested to be a Class 1 material (classified if the material passes the Part 7 test) **AND** passes the [Part 6 test](#) where it has a fire propagation index (I) of not more than 12 and sub-index (i<sub>1</sub>) of not more than 6.

# ISO 9705-1:2016

## Reaction to fire tests — Room corner test for wall and ceiling lining products — Part 1: Test method for a small room configuration



# SGS

### Test Report

No. SL120012300295TX-01

Date: Apr 08, 2020

Page 1 of 5

THE TEST RESULT ARE COPIED FROM ANOTHER REPORT (REPORT NO.: SL119013003448TX-01, ISSUED DATE: MAR 27, 2020) ISSUED BY OUR LABORATORY.

POLY PROTECH CO., LTD  
144/10 MOO 6, SOI WAT LAT WAI, BANGPRIENG SUBDISTRICT, BANGBO DISTRICT, SAMUTPRAKAM  
10560 THAILAND

The following sample(s) was/were submitted and identified on behalf of the client as:

Sample Description : copper foil/air bubble/silver foil material in copper/ silver for insulation  
Style No. : polyshield/polyx select series  
Manufacturer : POLY PROTECH CO., LTD  
Country of Destination : Thailand

Test Performed : Selected test(s) as requested by applicant

Sample Receiving Date : Nov 29, 2019  
Testing Period : Nov 29, 2019 - Mar 27, 2020  
Test Result(s) : Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. For further details, please refer to the following page(s).

# SGS

### Test Report

No. SL120012300295TX-01

Date: Apr 08, 2020

Page 5 of 5

### III. Test conducted

The fire test was conducted in accordance with AS ISO 9705-2003(R2016) Fire tests – Full-scale room test for surface products, and the report No. SL120012300295TX (Original: SL119013003448TX).

### IV. Conclusion

According to Assigning group numbers requirements, the sample assigned as **Group 1**.

$SMOGR_{RC} = 32.6 \text{ m}^2/\text{s}^2 \times 1000$

**Assigning group numbers** (According to AS 5637.1:2015 clause 4.2)

(a) Group 1—material that does not reach flashover when exposed to 100 kW for 600 s followed by exposure to 300 kW for 600 s.

(b) Group 2—material that reaches flashover following exposure to 300 kW within 600 s after not reaching flashover when exposed to 100 kW for 600 s.

(c) Group 3—material that reaches flashover in more than 120 s but within 600 s when exposed to 100 kW.

(d) Group 4—material that reaches flashover within 120 s when exposed to 100 kW.

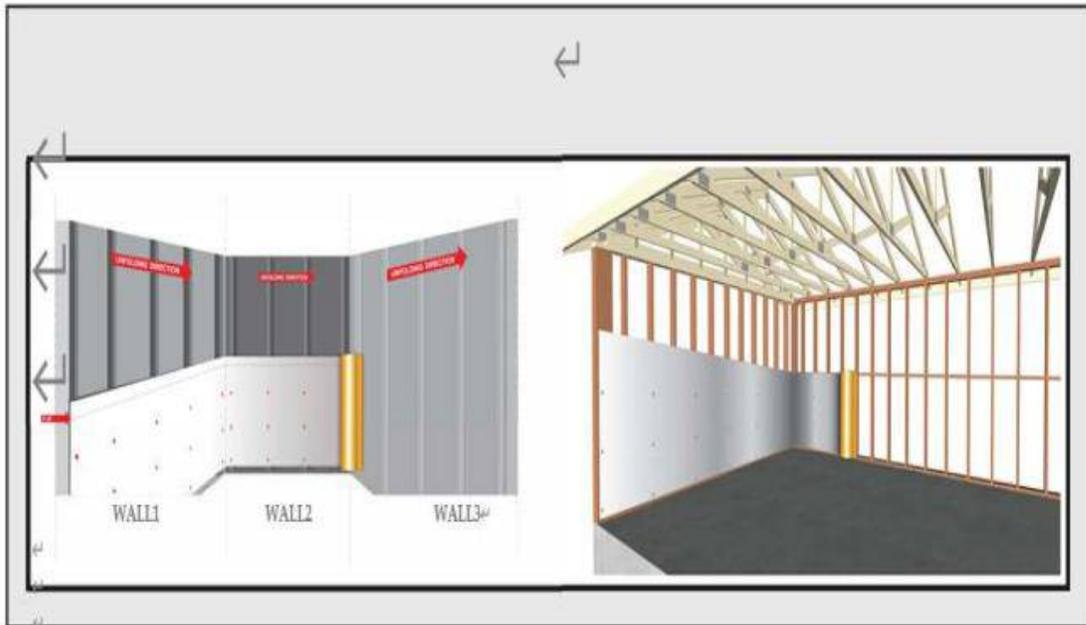


Figure 1: Wall Part-1



Figure 3: Ceiling section-1



Figure 4: Ceiling section-2

**Full Scale** :คือการจำลองการตีไฟเสมือนจริง คล้ายกับการทดสอบของทาง **FM Global Class 4880**

# Eco Specifier Certificate



**ecospecifier**  
global

green community  
trust brands

[advise.verify.market.connect](https://www.ecospecifier.com)

## Verified Product Certificate

This is to confirm that the following product has been verified as meeting the Ecospecifier Verified Product Standard and is approved for inclusion on [ecospecifier.com](https://www.ecospecifier.com).

COMPANY **Poly Protech**

PRODUCT **Reflective Insulation Products**

VALID TO **13/05/2022**

Ecospecifier's role is:

- ✓ To provide a third party, independent and unbiased assessment of information provided by manufacturers and other sources.
- ✓ To assess products using International Standards, independent test data, third party research and expert opinion.
- ✓ To determine if products are eco and health preferable based on the premise that:
  - they exhibit one or more eco or health preferable characteristic compared to other products in their category; or
  - they are a member of a product category that is in itself an eco or health preferred category; and
  - they do not contain 'significant' ecological or health damaging content.

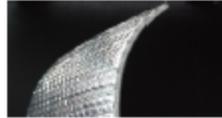
## Pass the ECO specifier global green product for the green building

None Hydrogen cyanide (HCN) /when getting burn

### Poly Protech – PolyShield Reflective Insulation Products

#### Overview

PolyShield products consist of single or multi thermal reflective layers of pure aluminium foil combined with multi or single layered inner core compositions. PolyShield products are designed for commercial, industrial, residential, and agricultural roofs, ceilings, walls, and suspended floors.



#### Product Description

PolyShield Reflective Insulation products are made of a nominal 3-12 mm thick and 1000/1200/1350 mm wide combined clear, fire retardant polyethylene bubble film, or various fire retardant foam/wool layers onto or between layers of reflective and low-emittance aluminium foil, which reflects up to 95-97% of radiant heat. Copper colour antiglare is an option used to reduce glare during installation.

PolyShield Reflective Insulation products provide effective energy efficiency without creating human or environmental risks associated with airborne fibres or Volatile Organic Compounds.

PolyShield Reflective Insulation products are safe to handle with no protective equipment such as gloves or breathing apparatus required. The products are fibre free, non itchy, and non-cancerous.

#### PRODUCT SPECIFICATIONS

Options	PolyShield Uno PolyShield Prima PolyShield Select 40+ PolyShield Select 40+ GOLD PolyShieldSelect 60+ PolyShieldSelect 60+ Copper (SHEDX) PolyShield Select 80+ PolyShield Select 80+ GOLD PolyShield Grande PolyShield Triplex PolyShield Acoustic PolyShield Extra PolyShield P2
Colours	Silver, Copper, White, Gold

#### HUMAN HEALTH

##### Health

Products are manufactured with safe polymer polyethylene without the use of formaldehyde (as some fibreglass and wool products are). As such, the products are able to provide energy efficiency without creating human health risks associated with airborne fibres or VOC emissions.

If applied, anti-corrosion, or, antiglare coatings contain a very small percentage (1/1000 of a gram per m<sup>2</sup>) of chemicals which in raw form prior to manufacture, are hazardous. However, after the ink is applied the product passes through a lamination process at approximately 250°C which disperses this solvent, therefore there is no further odour or off-gassing once manufactured.

##### Comfort

R-Values indicate that this system will reduce solar heat gain, particularly radiant gain, while also providing conduction resistance through the multi-layer polymer closed air cell structure. The thermal benefits achieved by these products result in a reduction in radiated heat transfer and in the demand for air conditioning and heating. This will potentially lead to improved individual thermal comfort levels, promoting a healthy indoor environment.

##### Indoor Environment Quality

Finished products do not emit VOCs, improving indoor air quality.

No irritation when skin contacts conformed to BS OHSAS 18001

#### Safety

Products are a fibre-free, non-allergenic and non-irritant insulation system, eliminating health or occupational health and safety risks to the occupants or installers.



This assessment is current only to the valid date and shall not be reproduced in part at any time. Please refer to the ecospecifier website for current detailed product listing information. © Ecospecifier 2020



**ACOUSTIC  
PERFORMANCE**

# Acoustic Simulation:

การจำลองค่ากันเสียงของ  
ฉนวนกันความร้อนใต้หลังคา  
Metal sheet

## Sound Insulation Prediction (v8.0.11)

Program copyright Marshall Day Acoustics 2015

- Key No. 4504

Margin of error is generally within STC +/- 3 dB

Job Name:

Job No.:

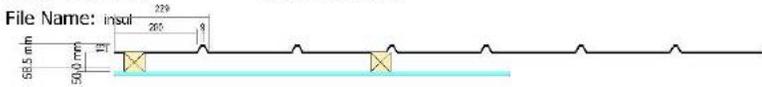
Page No.:

Notes:

Date: 13 Feb 20

Initials: Ivan Loo

File Name: insul



STC 23

OITC 18

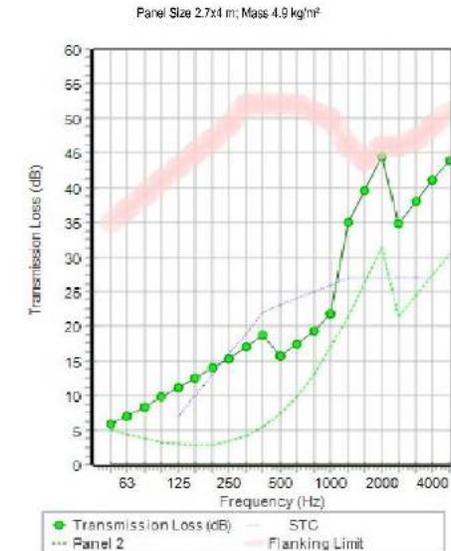
### System description

Panel 1 : 1 x 0.5 mm Steel Roofing (Imperial Rib) (p:7800 kg/m<sup>3</sup>, E:2.1E02 GPa, η:0.01, ρs:4.13 kg/m<sup>2</sup>, fc:2.358E4 Hz)

Cavity: Solid joist (timber or Twinplate); Stud spacing 600 mm  
Panel 2 + 1 x 8.0 mm Select 80 (p:1000 kg/m<sup>3</sup>, E:4.7GPa, η:3.70, ρs:0.1 kg/m<sup>2</sup>, fc:2.998E5 Hz)

Mass-air-mass resonant frequency =440 Hz

frequency (Hz)	TL(dB)	TL(dB)
50	6	
63	7	7
80	8	
100	10	
125	11	11
160	13	
200	14	
250	15	15
315	17	
400	19	
500	16	17
630	17	
800	19	
1000	22	22
1250	35	
1600	40	
2000	45	38
2500	35	
3150	38	
4000	41	40
5000	44	



# GREEN BUILDING PRODUCT FOR LEED CERTIFIED

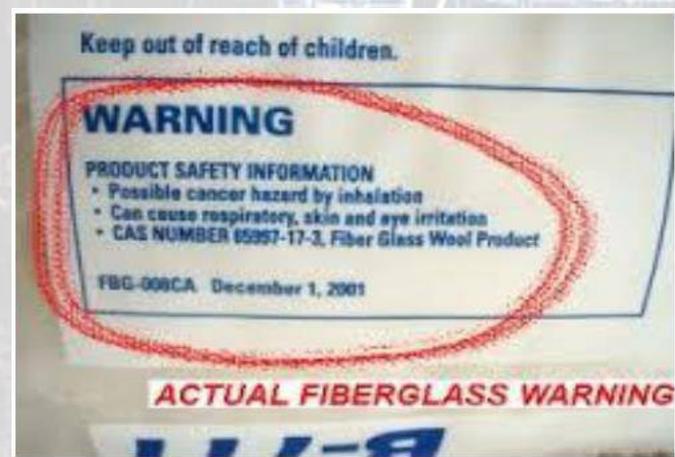
## L'quatech Products & Green Building Criteria

**SCG**  
BUILDING & LIVING CARE  
CONSULTING

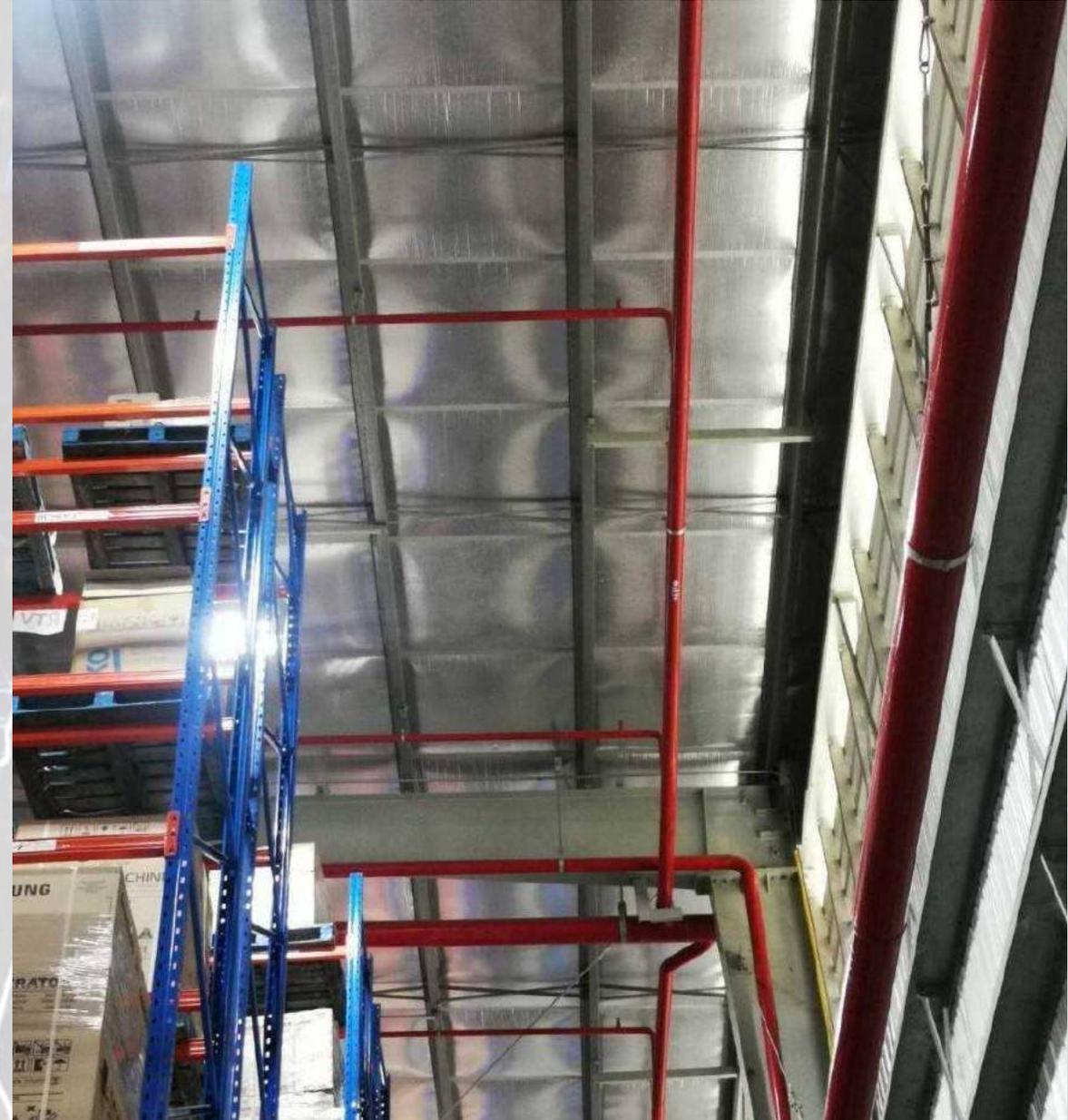
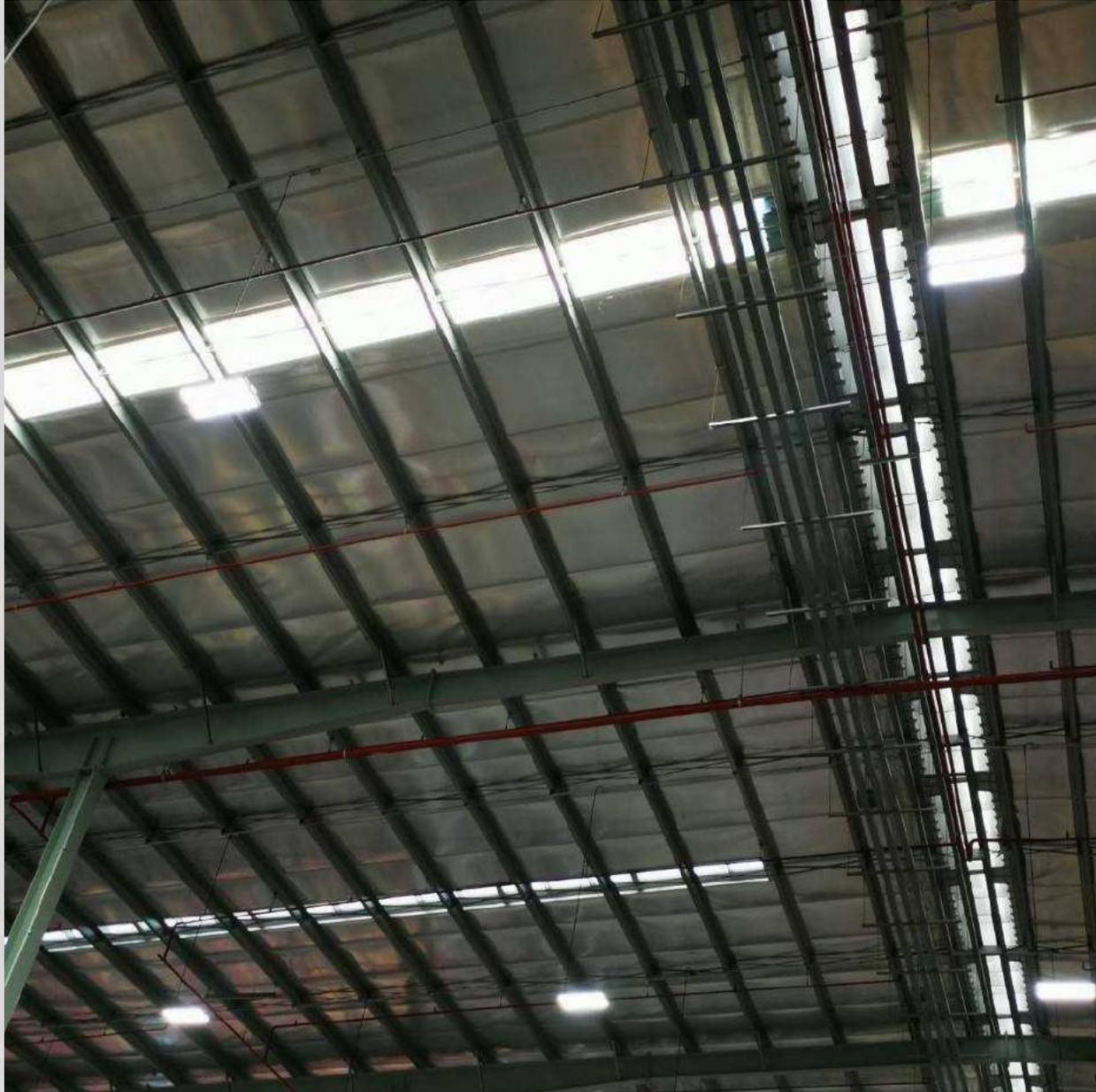
n	Application	Comply Credit Requirement
<b>1</b>  	<b>Insulation</b>  <ul style="list-style-type: none"> <li>Recycled Content [Pre-Consumer, Post-Consumer]</li> <li>LCA, EPD Report (Optional)</li> </ul>	<ul style="list-style-type: none"> <li>MR : BPDO</li> </ul>
	<ul style="list-style-type: none"> <li>VOC Emission with comply standard test</li> </ul>	<ul style="list-style-type: none"> <li>EQ : Low Emitting</li> </ul>
	<ul style="list-style-type: none"> <li>Thermal only : Thermal value with comply standard test</li> </ul>	<ul style="list-style-type: none"> <li>EA : Energy Performance</li> </ul>
	<ul style="list-style-type: none"> <li>Acoustic only : NRC for school; STC,NIC for other projects</li> </ul>	<ul style="list-style-type: none"> <li>EQ school : Min. Acoustic Performance</li> <li>EQ : Acoustic Performance</li> </ul>

## ปัญหาจากการใช้งานฉนวนประเภทเส้นใย

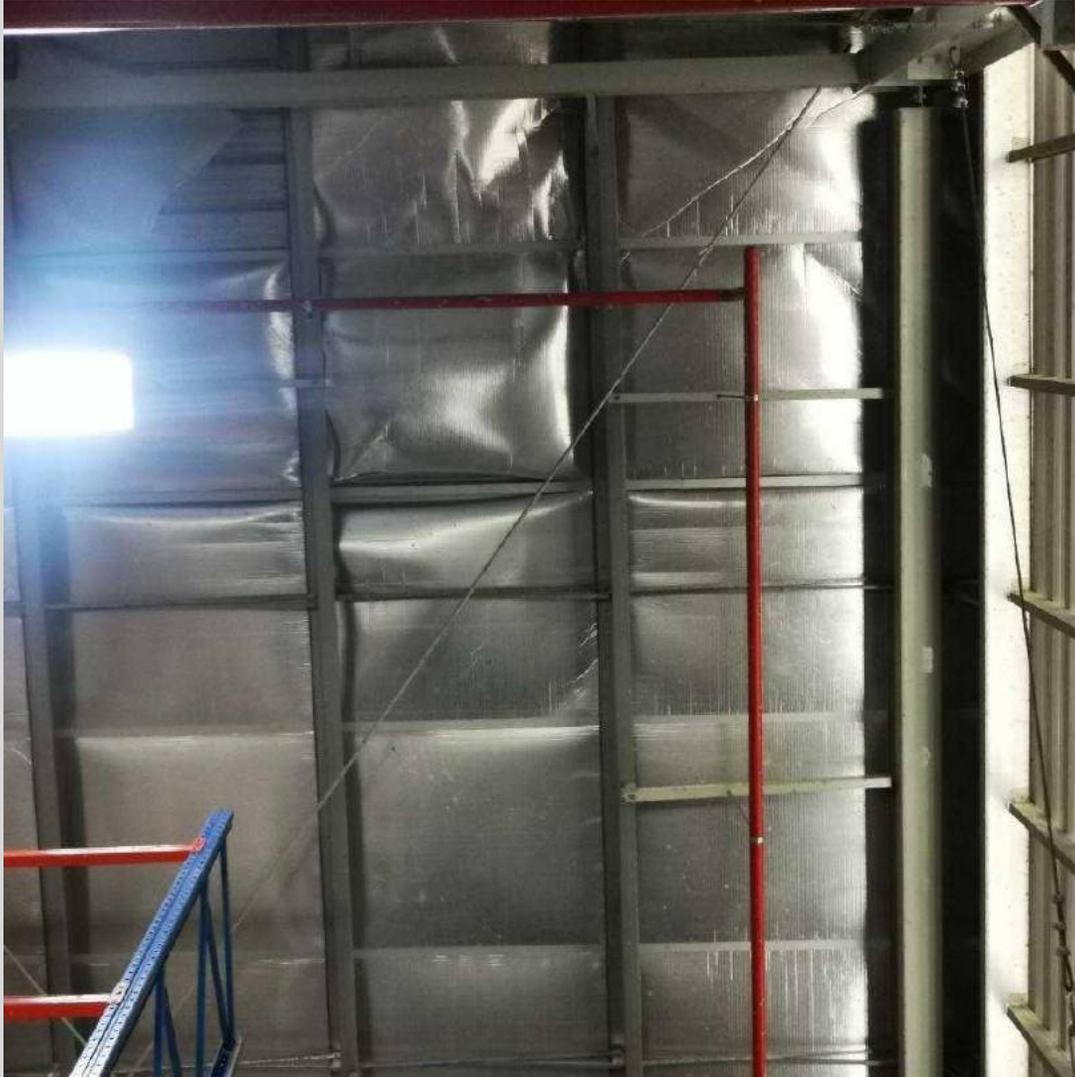
1. ปัญหาเรื่องค่ากันความร้อนที่น้อยกว่า และไม่สม่ำเสมอ เทียบกับ Bubble Foils ไม่คุ้มค่าการลงทุน
2. ปัญหาเรื่องความชื้น เชื้อรา นก หนู แมลง อยู่อาศัยทำรัง
3. ปัญหาเรื่องการติดตั้งยุ่งยากกว่า น้ำหนักมากกว่า อุปกรณ์เสริมเยอะกว่า ต้องใช้ Wiremesh ราคาทั้งระบบแพงกว่า
4. เบสวัสดุอาจจะไม่ติดไฟ แต่กระดาษห่อหรือผ้าหุ้มติดไฟและลามไฟได้ วัสดุที่ได้ FM เป็นรุ่นพิเศษไม่ใช่รุ่นฉนวนกันความร้อน แต่เป็นวัสดุที่ทำงานห่อ ที่มีคุณภาพสูงกว่า ซึ่งถ้าจะซื้อสเปคเดียวกันราคาจะสูงกว่างานฉนวนปกติ ปริมาณควันเมื่อเกิดเพลิงไหม้สูงเป็นเหตุให้มีผู้เสียชีวิตได้
5. อาจมีการแพ้ คัน ได้ ขณะติดตั้ง เส้นใยบางประเภทสามารถสะสมและทำให้เกิดมะเร็งได้
6. อายุการใช้งานสั้นกว่า Bubble Foils เพราะไม่ทนต่อการเปลี่ยนแปลงอุณหภูมิ cost renovate เป็นของ Owner



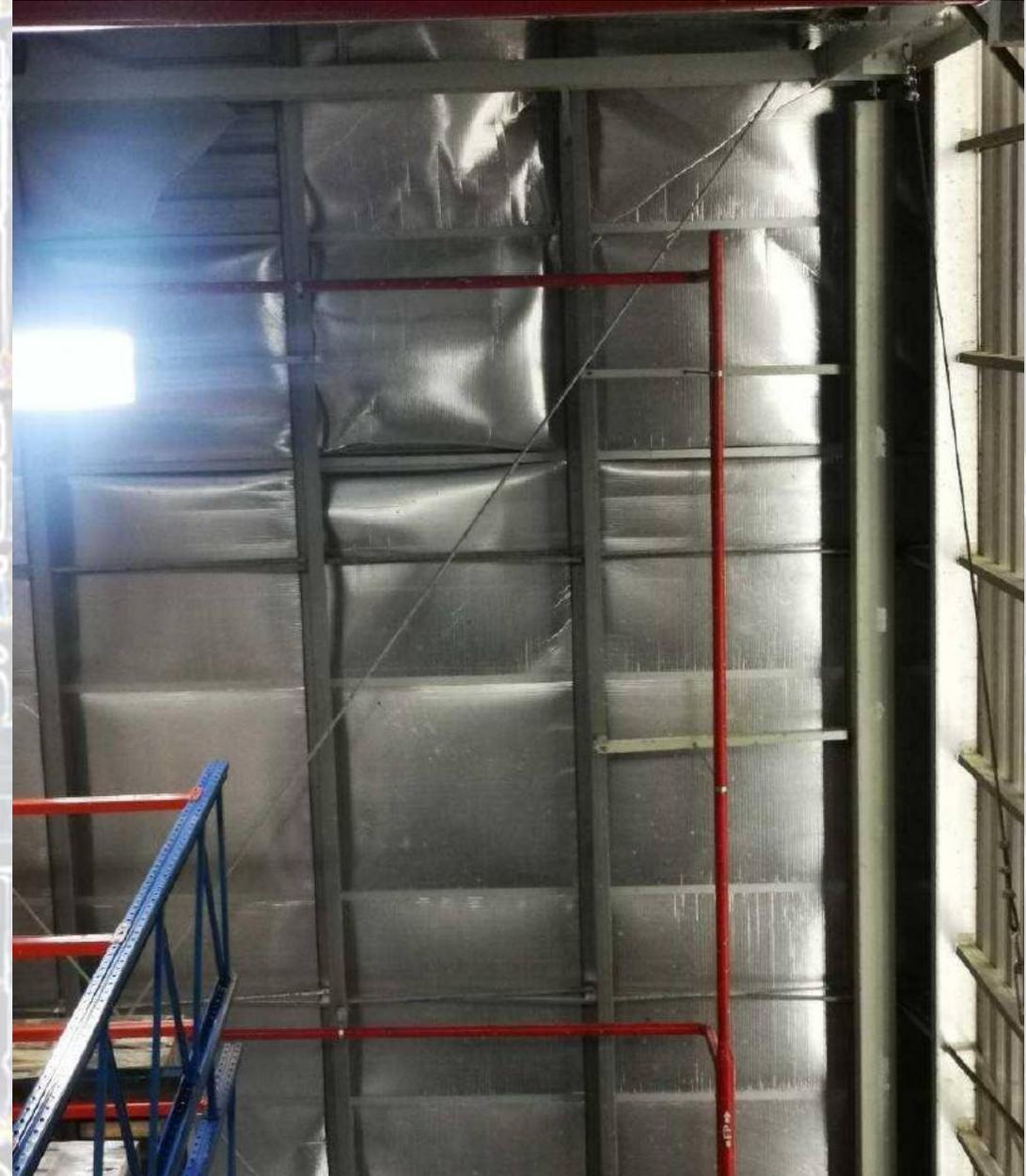
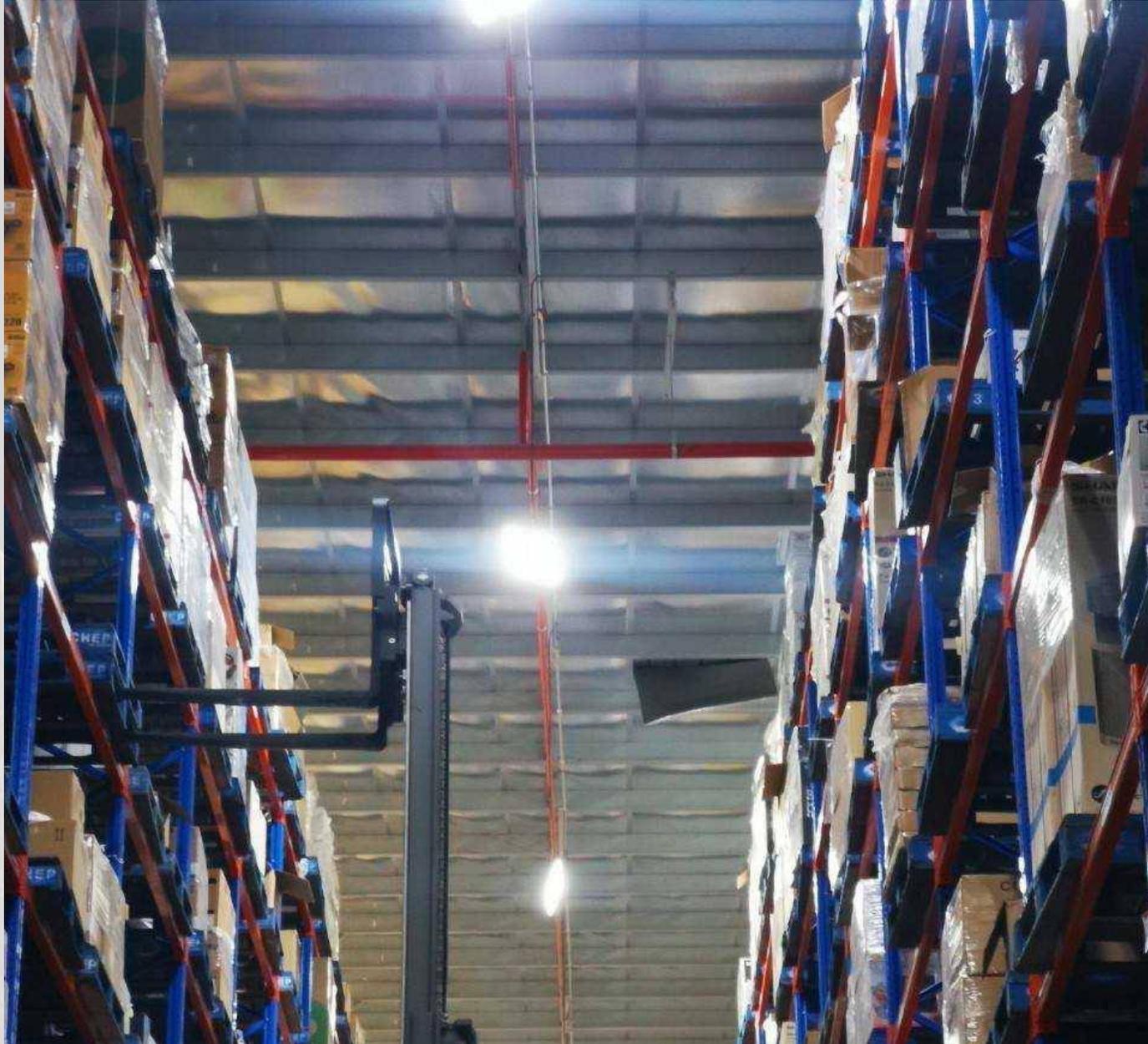
Problems after installation under high roofing temperature, Just for a few years



# Problems after installation under high roofing temperature, Just for a few years



Problems after installation under high roofing temperature, Just for a few years





**ขั้นตอนการติดตั้ง**  
**Installation**

# Installation

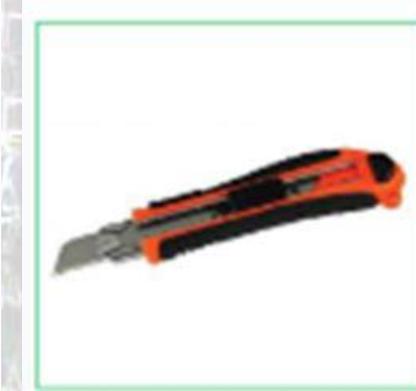
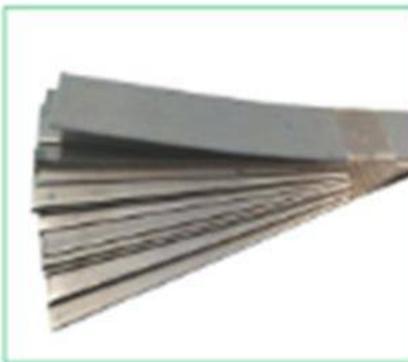
## อุปกรณ์ (Tools and Equipment needed)



- ✓ แผ่นฉนวนกันความร้อน BUBBLE FOILS



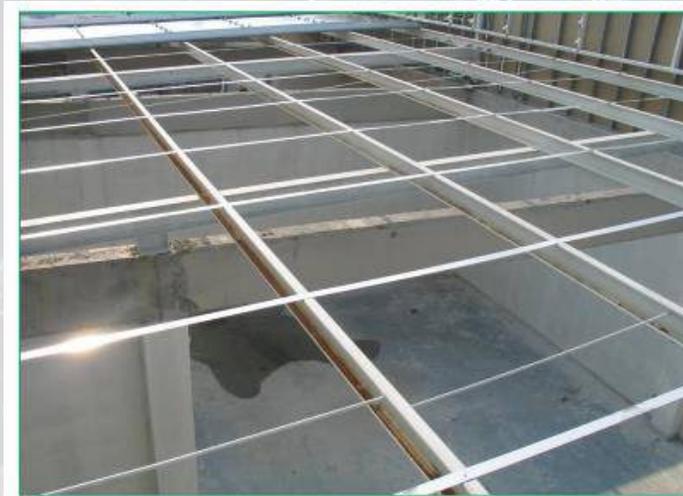
- ✓ Screw
- ✓ Aluminum tape
- ✓ Metal Strip
- ✓ Measuring tape
- ✓ Cutter



# Installation

1

วัดระยะการวางแนว Metal Strip  
จากนั้น ทำการยึด Metal Strip  
ให้ ติดกับแป โดยใช้ สกรูเกลียวปล้อย



2

ตัดแผ่นฉนวนกันความร้อนตามความยาวของหลังคา  
จากนั้นติดแผ่นฉนวนกันความร้อนให้ ตรงกับแนวของ  
Metal Strip โดนหันด้านที่มีเส้นยับลงสู่ตัวอาคาร  
และยึดให้ แน่นด้วยเกลียวปล้อย



# Installation

3

- รอยต่อแผ่นฉนวนให้ ซ้อนทับกัน 3-5 ซม. จากนั้นติดเทปกาวยึดรอยต่อระหว่างแผ่น
- เก็บงานด้วยการเก็บรายละเอียดช่วงปลายแผ่น ด้วยการพับขอบปลายฉนวนเข้าหาปลาย หลังคาให้เรียบร้อย



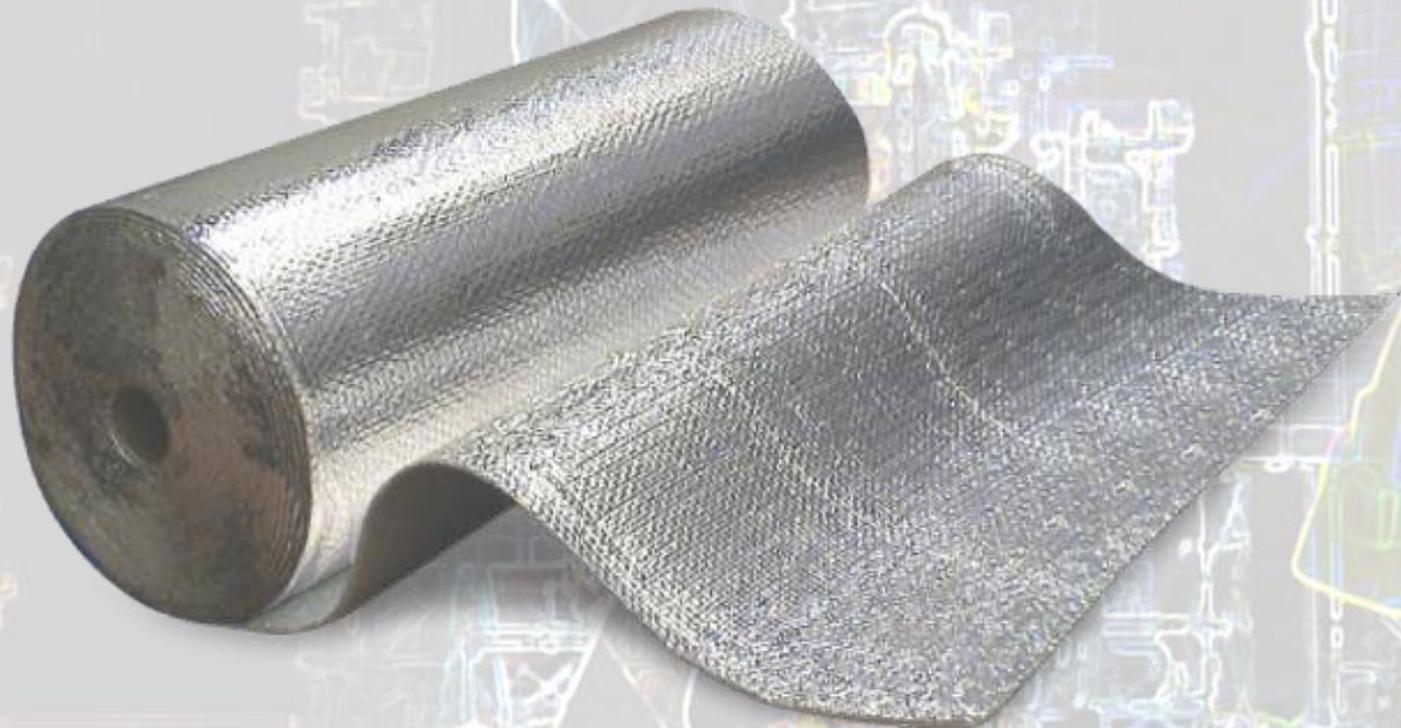
4

ติดแผ่นฉนวนกันความร้อนตามความยาวของหลังคา จากนั้นติดแผ่นฉนวนกันความร้อนให้ ตรงกับแนวของ Metal Strip โคนหันด้านที่มีเส้นยับลงสู่ตัวอาคาร และยึดให้ แน่นด้วยเกลียวปล้อย

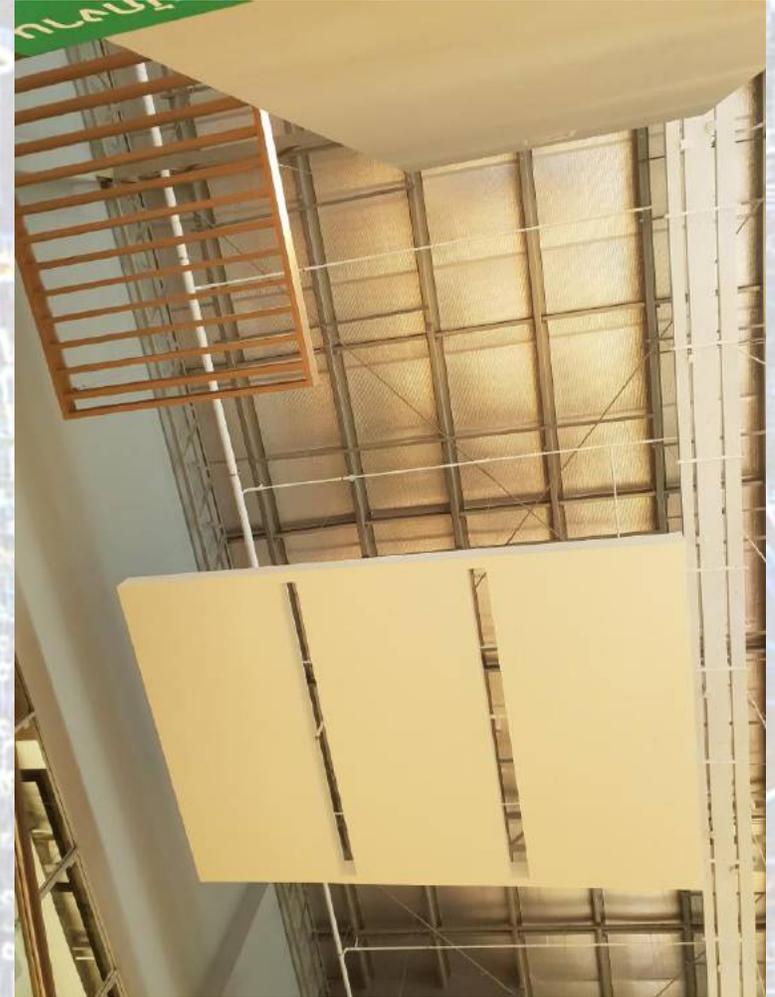


# Project Reference

REFLECTIVE INSULATION

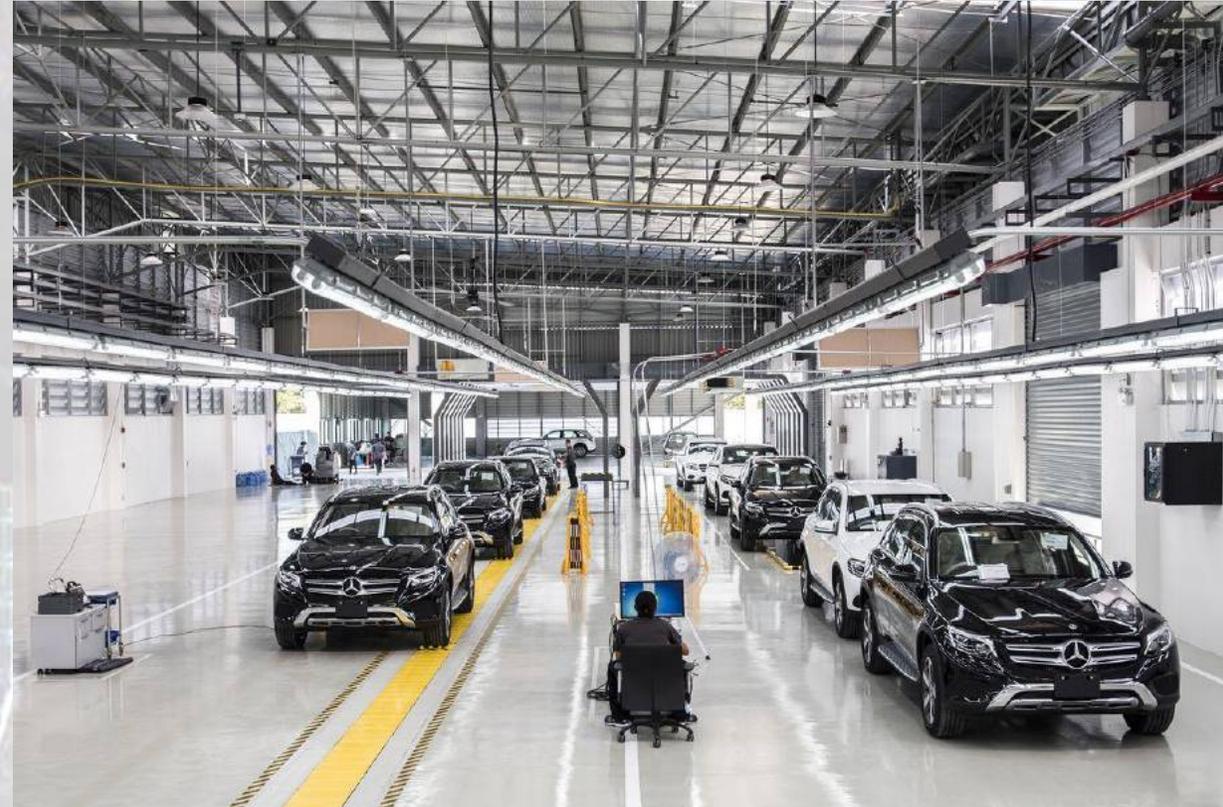


# Tesco Lotus. Y2004 -2023



# BENZ-BANGCHAN Warehouse.

Y2019



# CP ALL MARACHAI Y2019



# PTT ว่างจันทร์ วัลเลย์. Y2020



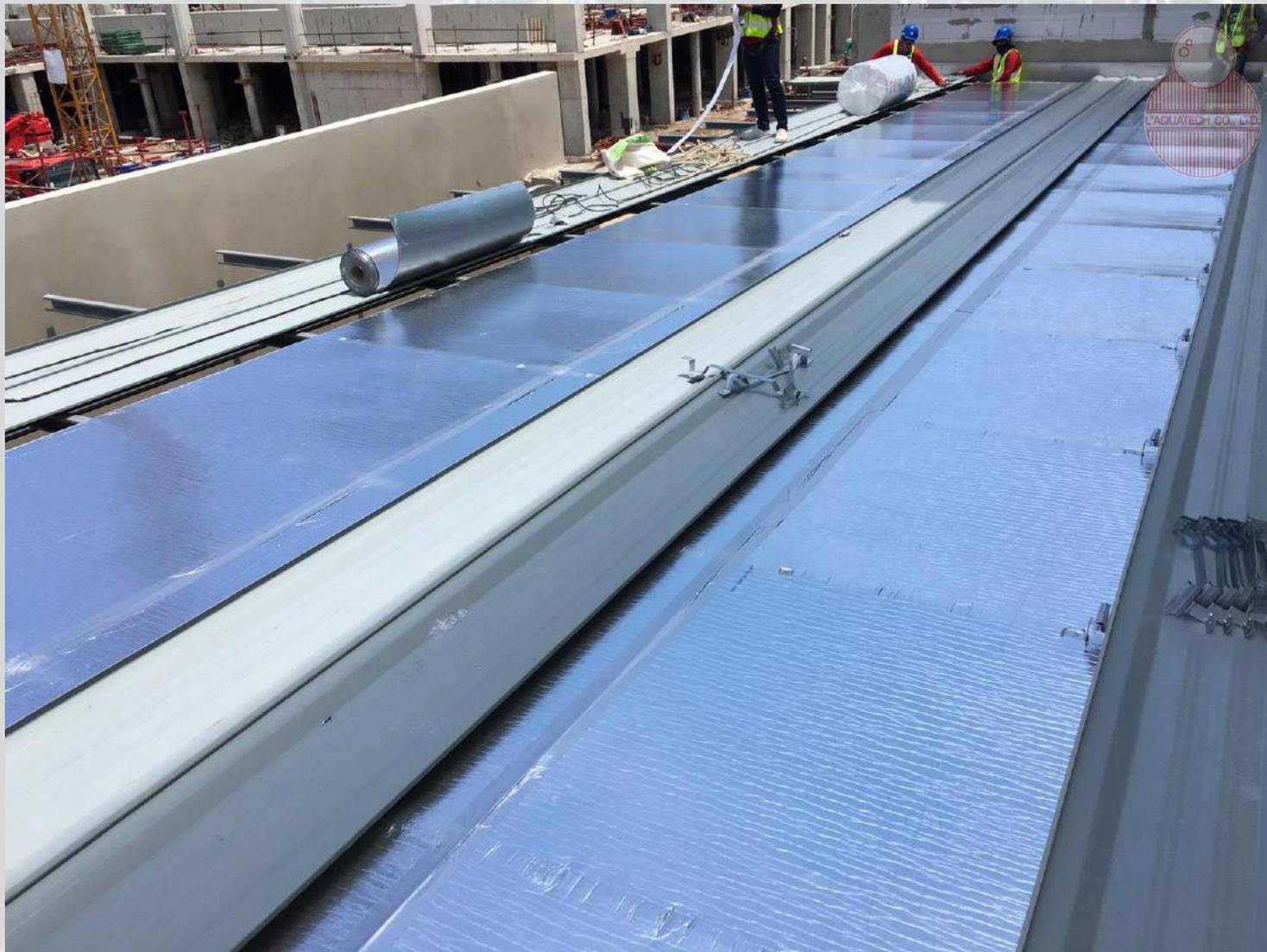
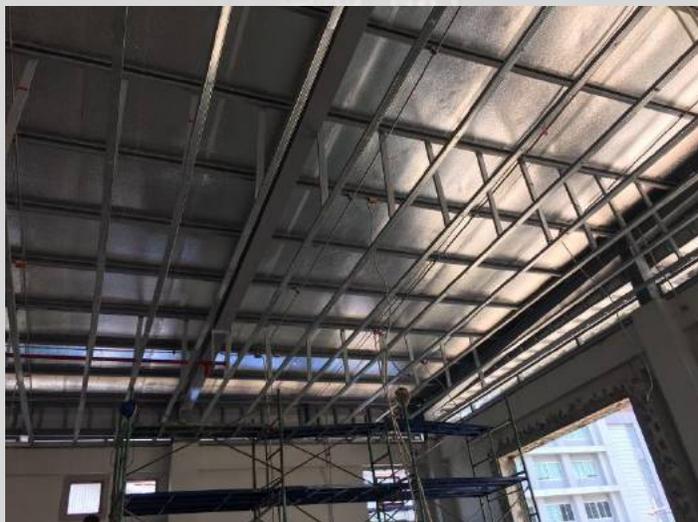
# OSOTSPA FACTORY Y2020



# OSOTSPA FACTORY Y2020



# รถไฟฟ้าสายสีเหลือง



# Bangkok Free trade zone



# Channakon Warehouse



# Greenlatex



# FN FLYNOW Factory



# TOSHIBA NEW FACTORY



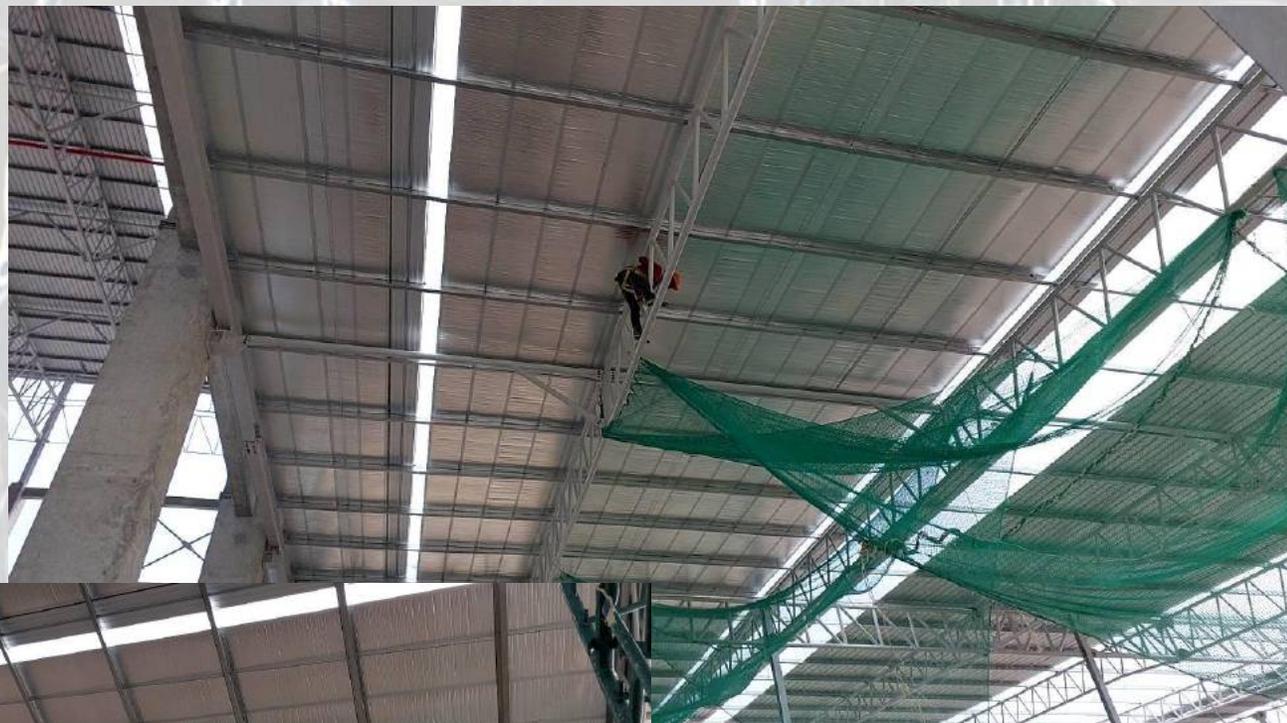
# PIONEER CARGO



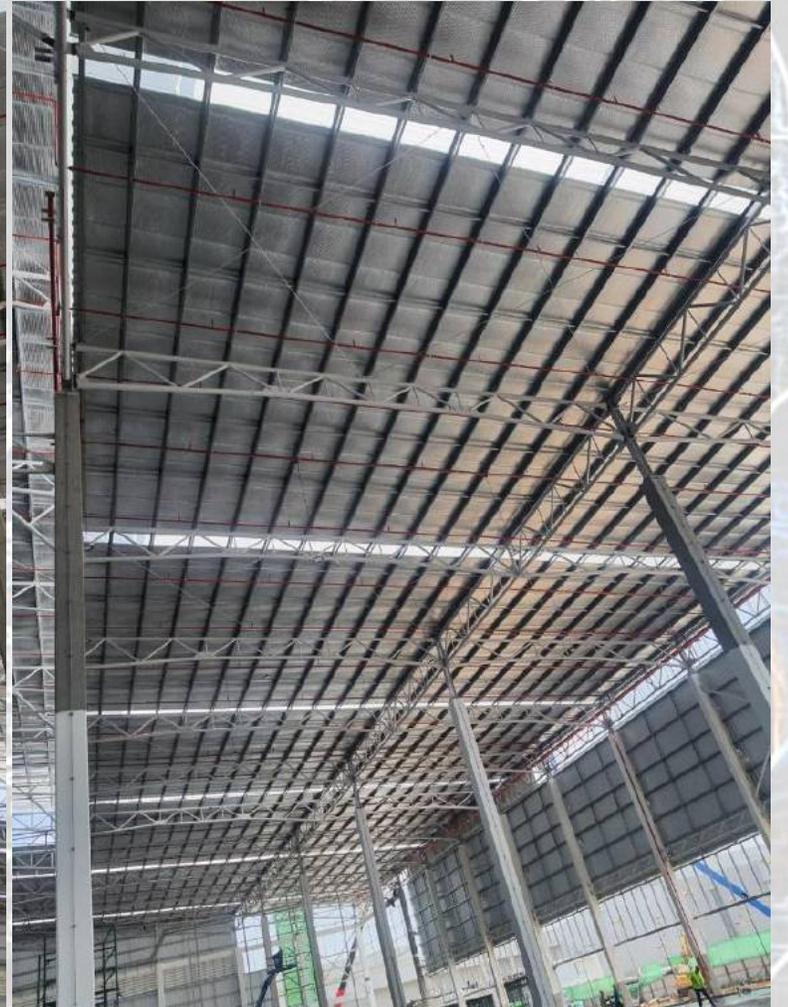
# FAPPE



บริษัท เซ็ปเป้ จำกัด (มหาชน)  
อำเภอลำลูกกา จังหวัดปทุมธานี



# YELLOW WOOD. Y2021



# FUJUTRANS



# WATSON DC Y2022



# TAO BIN Y2023



THANK YOU

