Steel Connect Webinar – Dec 23

Expert Insights on Roofing Materials: A Comparative Study of uPVC vs. Coated Steel Roofing Performance Criteria

14 December 2023
10am – 11am

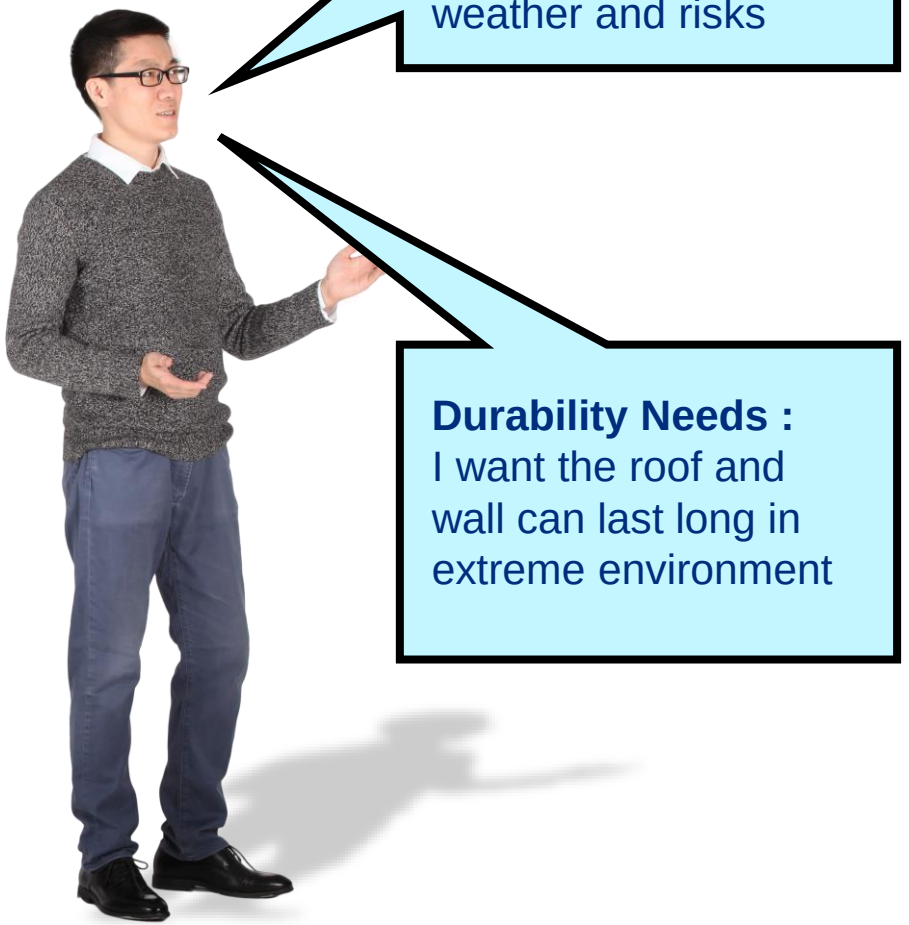
Disclaimer: the information presented does not constitute legal advice and is being presented for informational purposes only. The suggestions presented in this broad overview may not apply to your specific circumstances.

FOCUS OF TODAY

1. The Basic Needs, Durability and Design Requirements
2. uPVC vs Coated Steel Roof In Achieving the Basic Needs
3. uPVC vs Coated Steel Roof In Achieving the Durability
4. Q & A

The Basic Needs, Durability and Design Requirements

BASIC NEEDS & DURABILITY VS DESIGN REQUIREMENTS



Basic Needs :
I want the roof and wall protect my people and asset from weather and risks

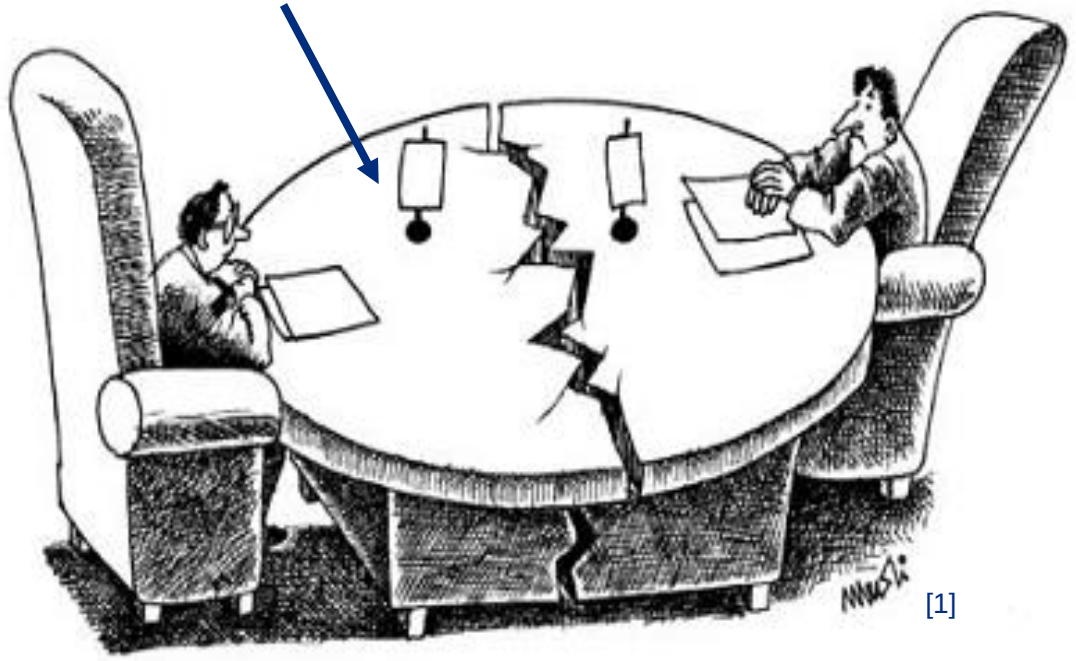
Durability Needs :
I want the roof and wall can last long in extreme environment

Design Requirements:
We need the roof and wall product that is capable in withstand loads, no water leakage and hazard free

Design Requirements:
Then, we need it to be made by material that can withstand extreme environment with proven record

WHAT HAPPEN IF BASIC NEEDS ARE NOT COMPLIED?

You will be having a durable product that is not serve for basic needs

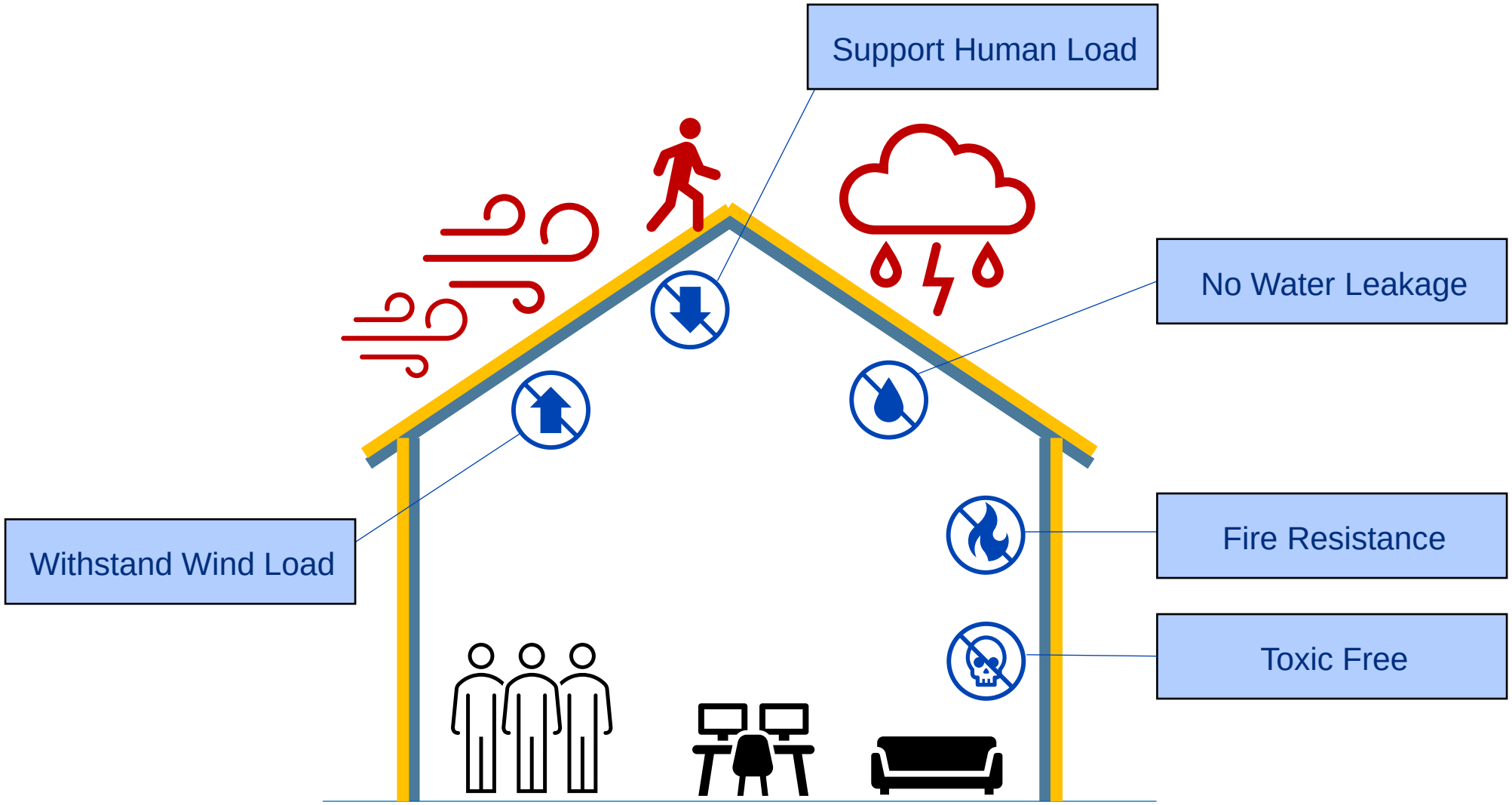


[1]

Source [1]: https://www.ihhp.com/blog/2016/02/01/the-last-8-conversation/

WHAT ARE THE BASIC NEEDS AND DURABILITY OF ROOF AND WALL DESIGN?

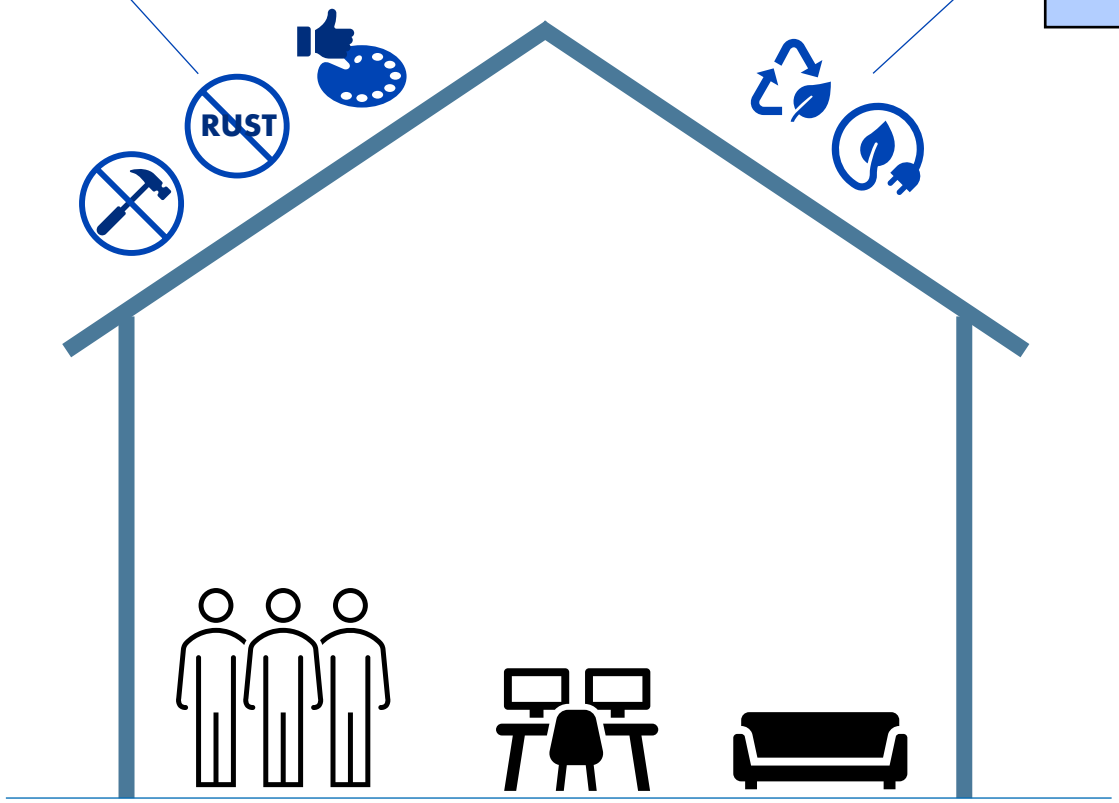
BASIC NEEDS OF ROOF & WALL ON A BUILDING



DURABILITY OF ROOF & WALL ON A BUILDING

Long Lasting Material to Reduce
The Repairing Frequency

Capture With New Trends



uPVC vs Coated Steel Roof In Achieving the Basic Needs

1.0 Resist Wind Load & Support Human Load

BEFORE COATED STEEL ROOF WAS WIDELY USED

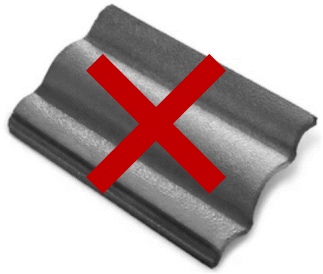

[1]


[2]

Source [1]: https://firstamericanroofing.com/clay-roof-cost/
Source [2]: https://miamism.com/historic-cuban-barrel-tile/

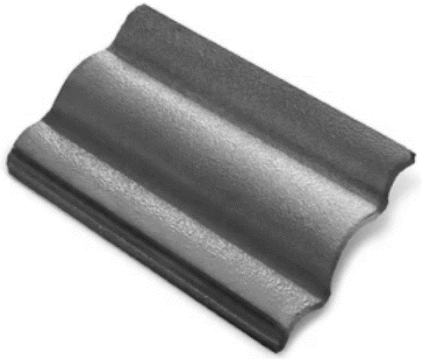
- Low security – easily break in
- Heavy enough to resist wind load
- Strong enough to support human load
- Close support is needed
- High labour intensive

Why not the first steel roof introduced was not exactly like clay tile?



But it is in long length thin gauge steel and screw fixed?

DIFFERENT IN MATERIAL BEHAVIOUR



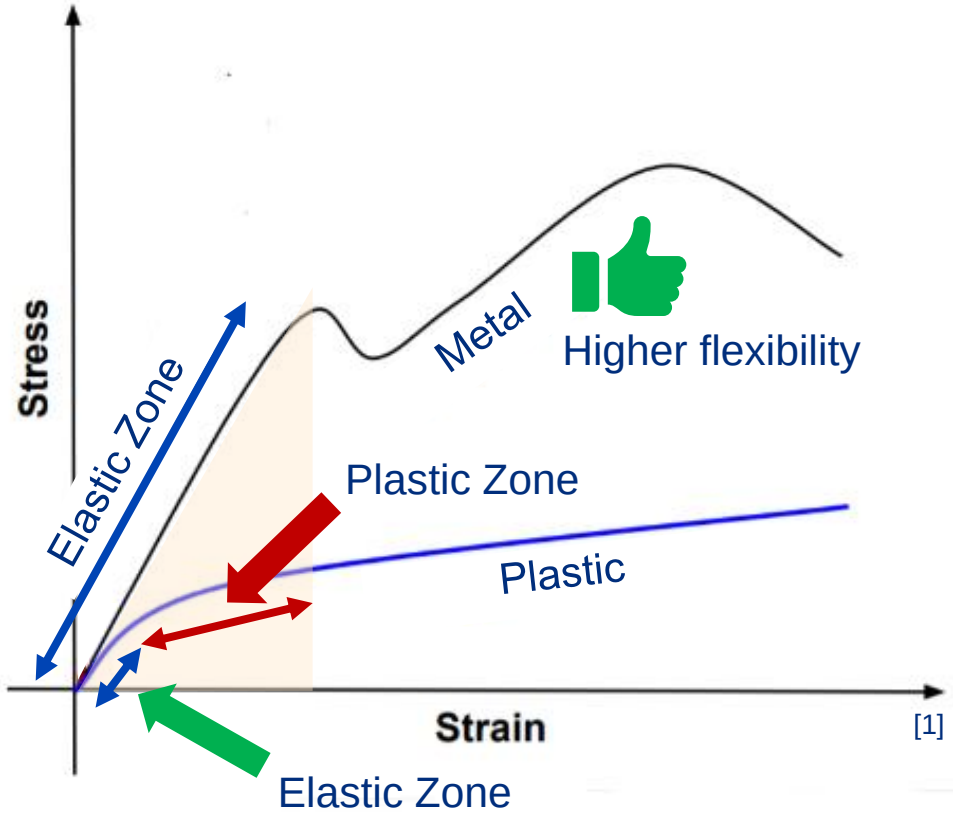
- Very thick steel to achieve the same stress capacity ✗
- Roughen the surface to increase friction ✗

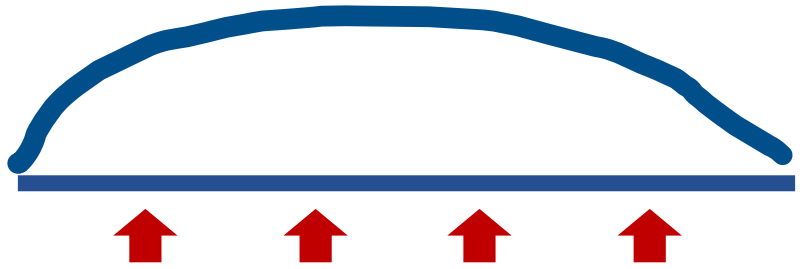
Used the material behaviour to design the product

- High security – screw fixed 👍
- Flexible enough to resist wind load 👍
- Stiff enough to support human load 👍
- Long spanning capacity 👍
- Less labours are needed 👍

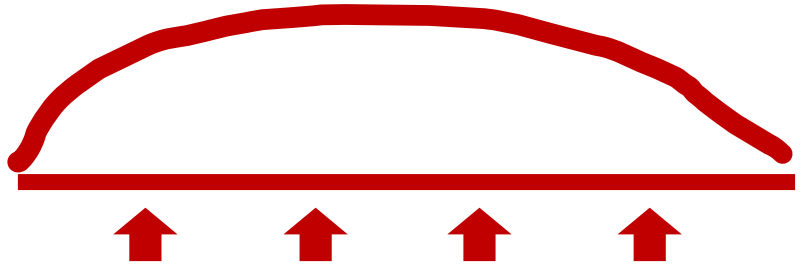
Source [1]: https://www.roofingsupermarket.com.au/product/custom-orb-048-colorbond-matt/

MATERIAL BEHAVIOUR – COATED STEEL VS UPVC





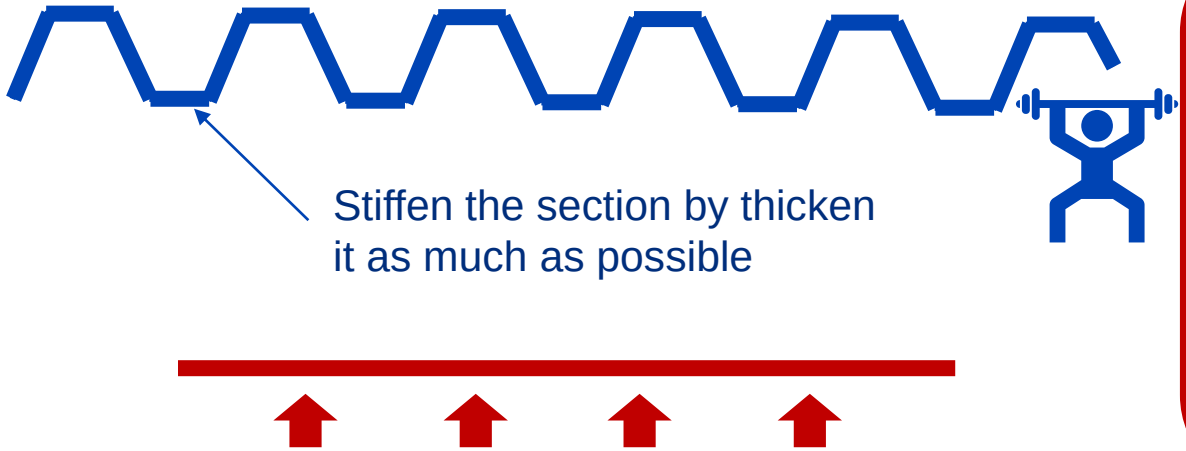
Steel

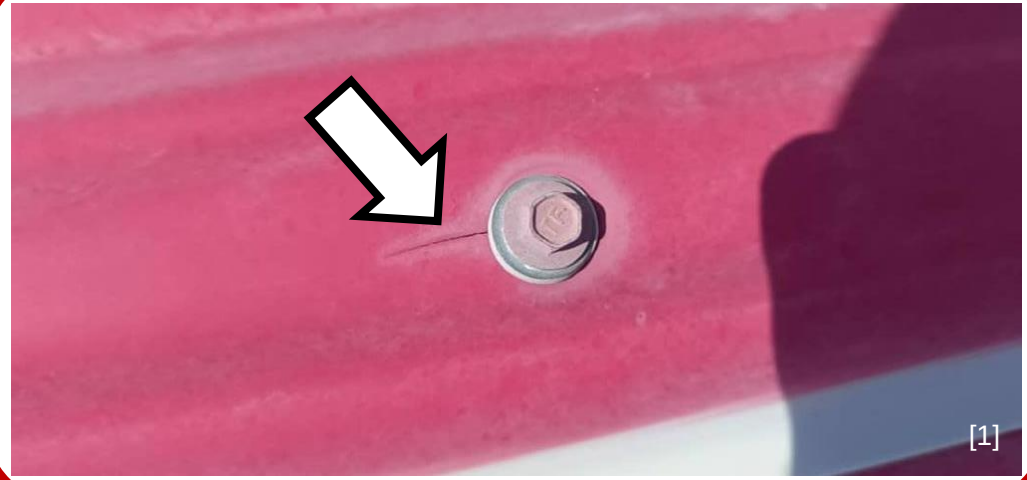


uPVC

Source [1]: https://www.smlease.com/entries/mechanical-design-basics/stress-strain-curve-diagram/

ENHANCE STRUCTURAL PERFORMANCE OF UPVC ROOF




[1]

3.5 to 7 Times Thicker than Coated Steel!

Stiffer = Brittle

In addition, the absent of plasticiser make uPVC less flexible in resisting wind uplift load


[2]

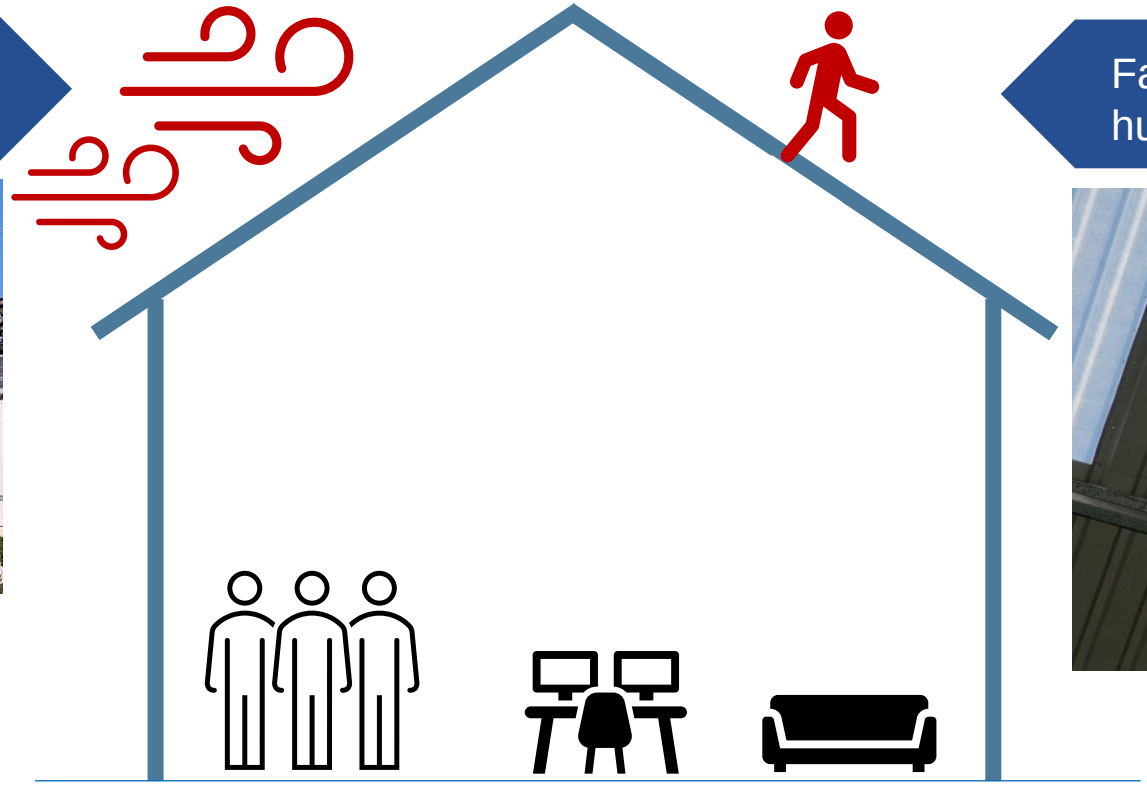
Localise damages

Source [1]: https://www.facebook.com/pamnorthernchapter/videos/714374750491114/ by Swissma Building Technologies S/B
Source [2]: Lavenda Steel S/B

CONSEQUENCE OF LOCALIZE DAMAGES OF UPVC ROOF

Failed in resist wind load

[1]



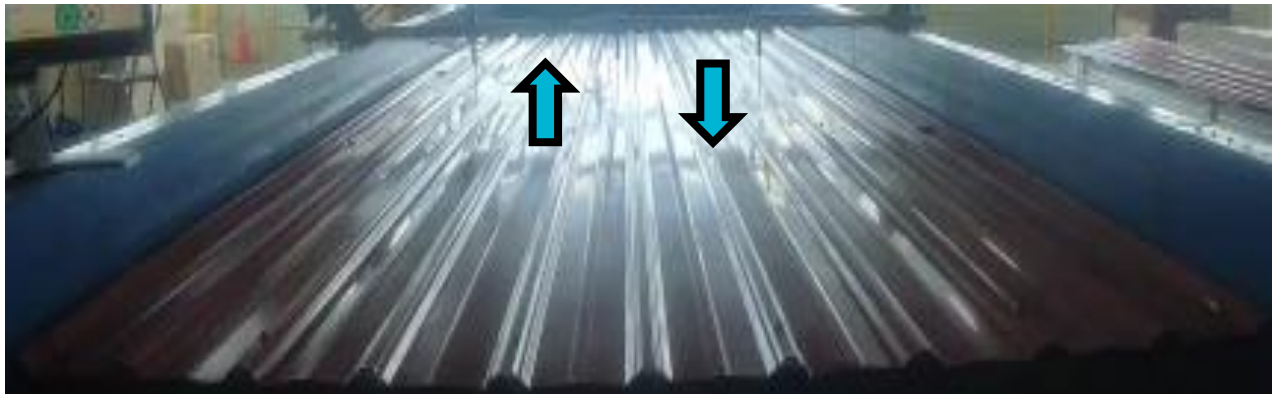
Failed in resist human load

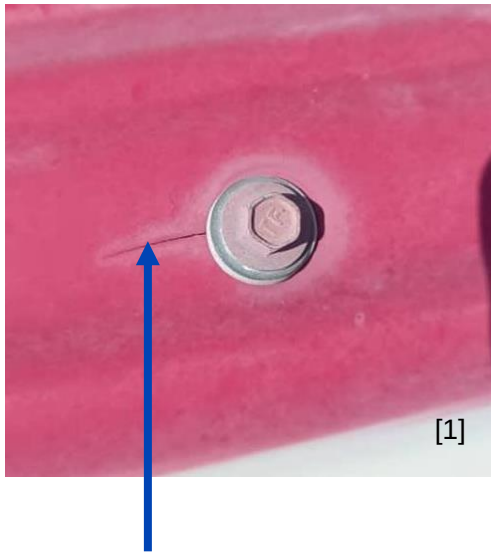
[2]

Source[1]: https://www.istockphoto.com/photo/hurricane-roof-damage-gm115890519-1516011?phrase=metal+roof+damage
Source[2]: https://www.ioshmagazine.com/2021/02/26/roofing-firm-fined-ps165000-after-fatal-rooflight-fall

2.0 Water Leakage

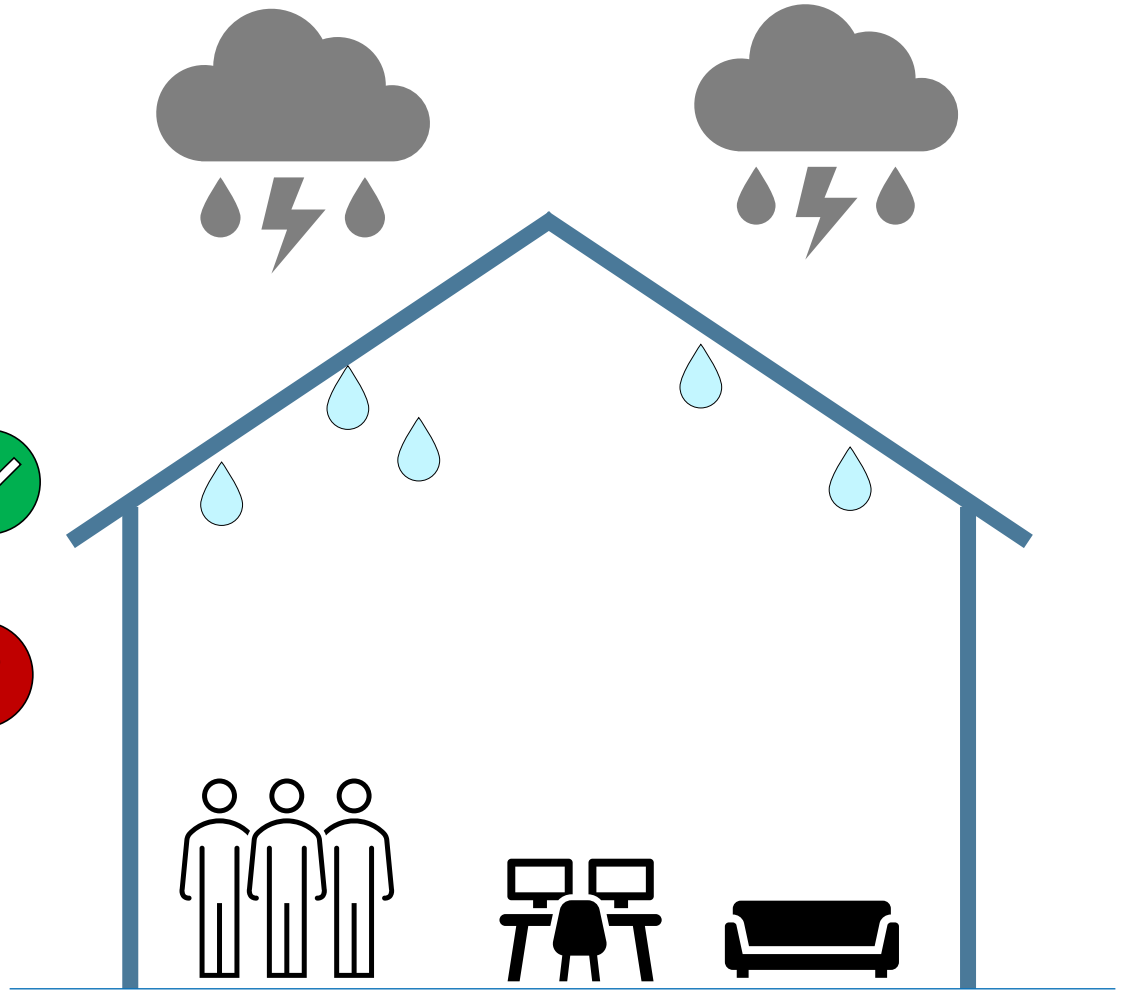
A) FLEXIBILITY – COATED STEEL VS UPVC





Steel

uPVC



The absent of plasticiser make uPVC less flexible in resisting wind uplift load and cause localise damage easily

Source [1]: https://www.facebook.com/pamnorthernchapter/videos/714374750491114/ by Swissma Building Technologies S/B

B) THERMAL MOVEMENT – COATED STEEL VS UPVC

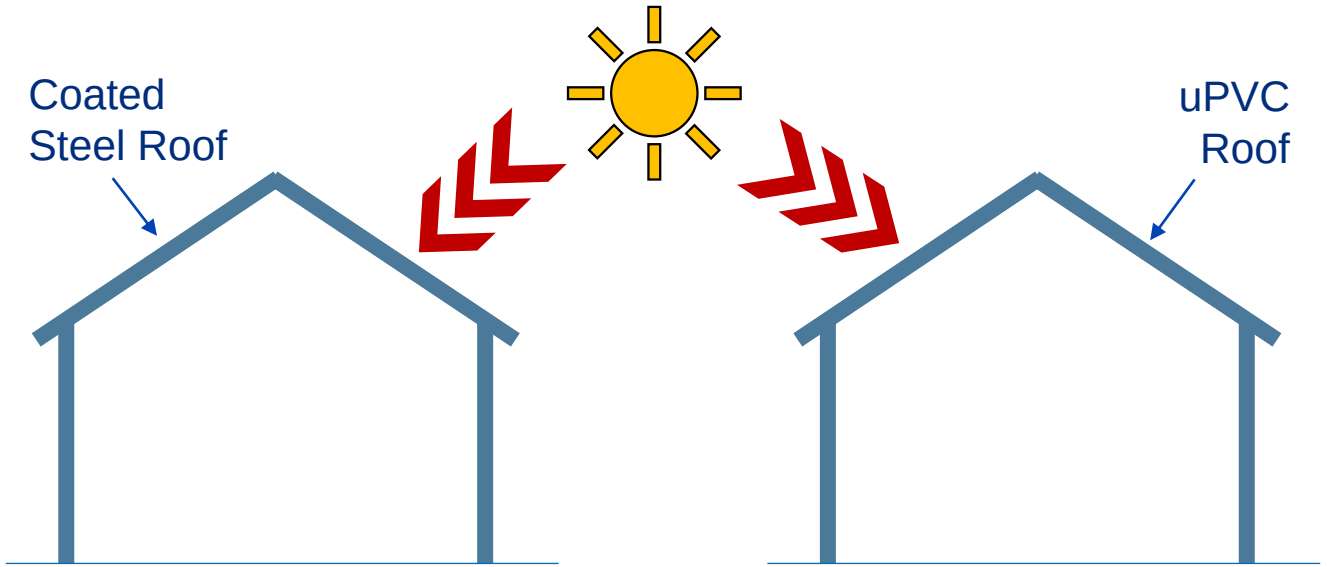
Thermal Expansion Formula:

$$\Delta L = L_o \times \Delta T \times \alpha$$

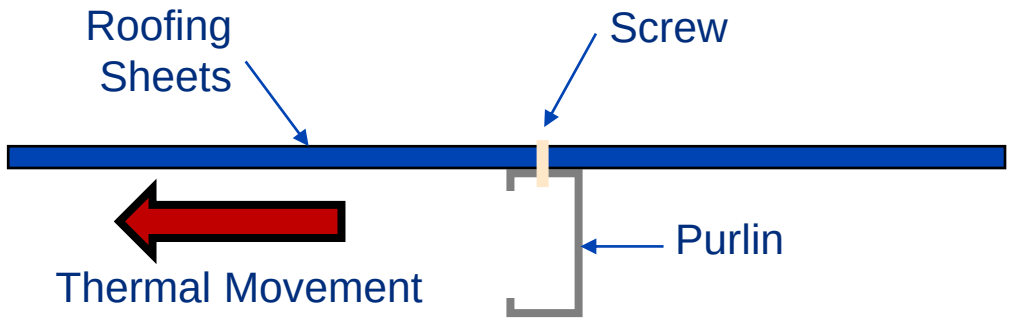
- Longer the sheet
- Bigger the change of temperature
- Higher the coefficient

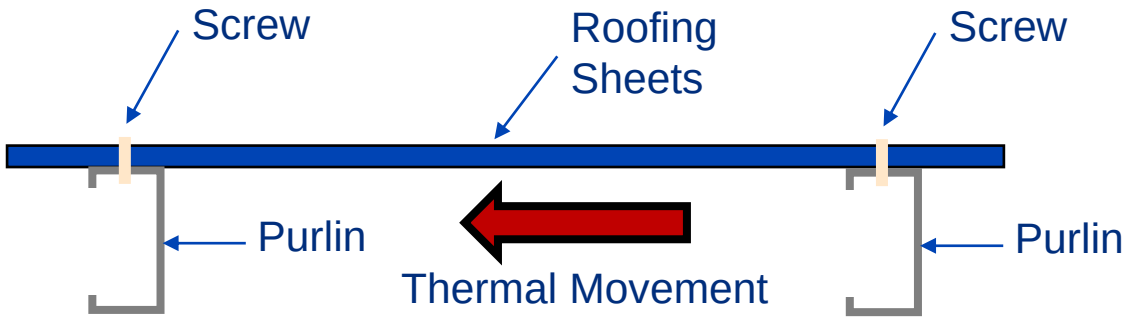
Thermal Movement

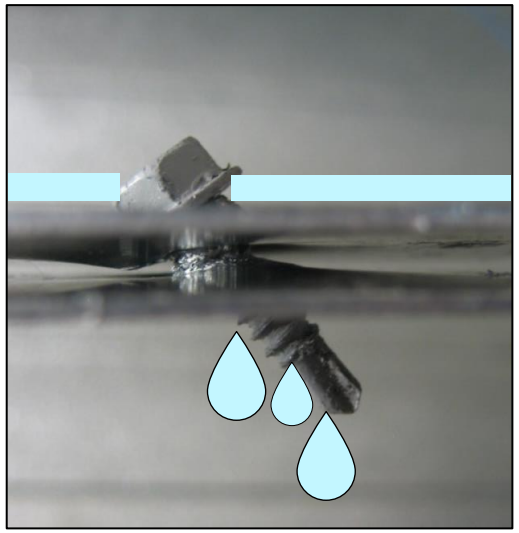
ΔL = Change in Length (m)
L_0 = Original Length of Sheet (m)
ΔT = Change in Temperature (°C)
α = Linear Expansion Coefficient of Material



CONSEQUENCE OF BIG THERMAL MOVEMENT







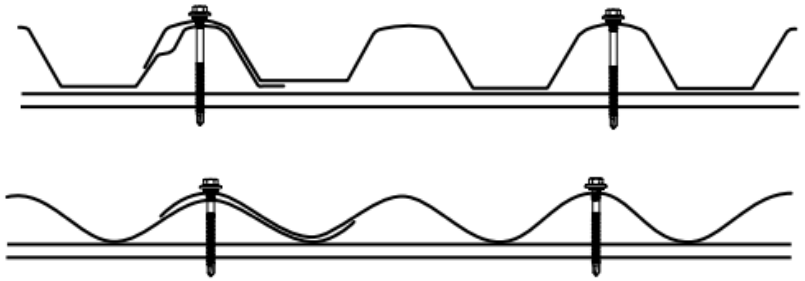
Roofing sheets shall be failed in shear at screw area by thermal movement and cause water leakage

uPVC roofing sheets may be deformed under thermal and give way to water passage

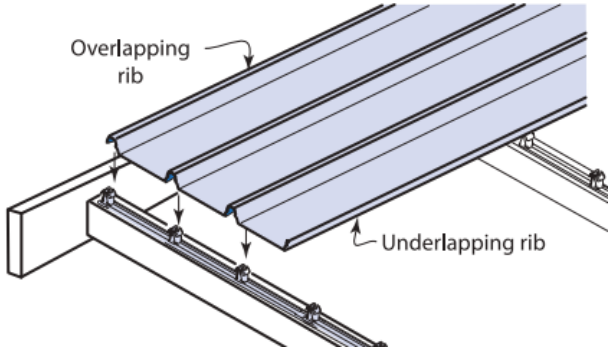
Source [1]: https://www.facebook.com/pamnorthernchapter/videos/714374750491114/ by Swissma Building Technologies Sdn. Bhd

C) FIXING METHOD - SCREW FIXED VS CONCEALED FIXED ROOF

Screw Fixed Product



Concealed Fixed Product

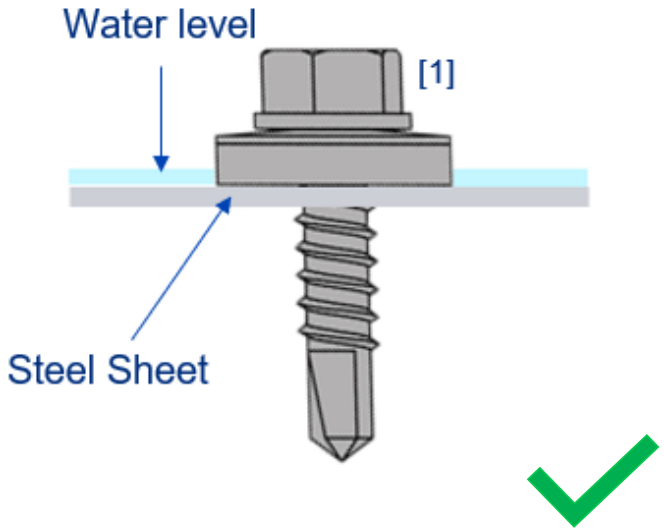


Source[1]: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://image.archify.com/catalog/supplier_brochures/y939f-uuf5k-1570507554lysaght-klip-lok-optima-my-brochure.pdf
Source[2]: https://www.americanmetalroofs.com/blog/p.140409000/what-you-need-to-know-about-through-fastened-metal-roofing/

DISADVANTAGE OF SCREW FIXED ROOF

The possible risks if screw fixed product is used on roof.

Correctly Driven



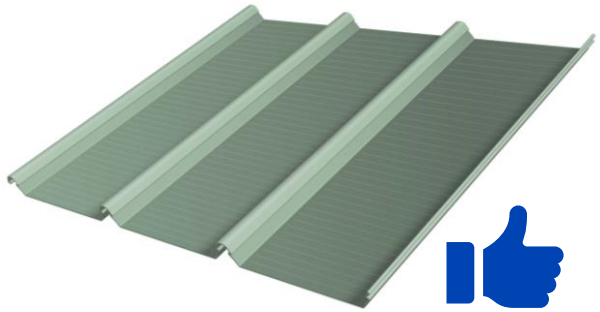
Rubber washer is well compressed and properly seal the water path

PRODUCT OPTIONS FOR BETTER WATER TIGHTNESS – COATED STEEL VS UPVC

Screw Fixed Product

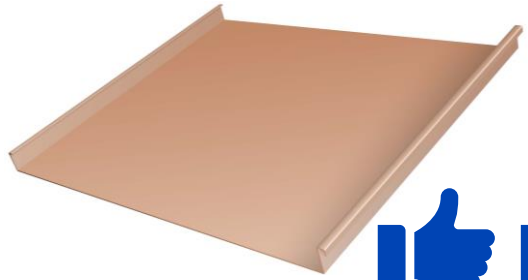
- Coated Steel ✓
- uPVC ✓

Concealed Fixed Product



- Coated Steel ✓
- uPVC ✗

Standing Seam Product



- Coated Steel ✓
- uPVC ✗

3.0 Fire Resistance

HOW FIRE START, SPREAD AND FLASHOVER

30 seconds to 3 minutes
100°C to 400°C

4 minutes to 5 minutes
600°C to 800°C

5 minutes to 60 minutes or more
1000°C to 1200°C

What is the ideal escape time?

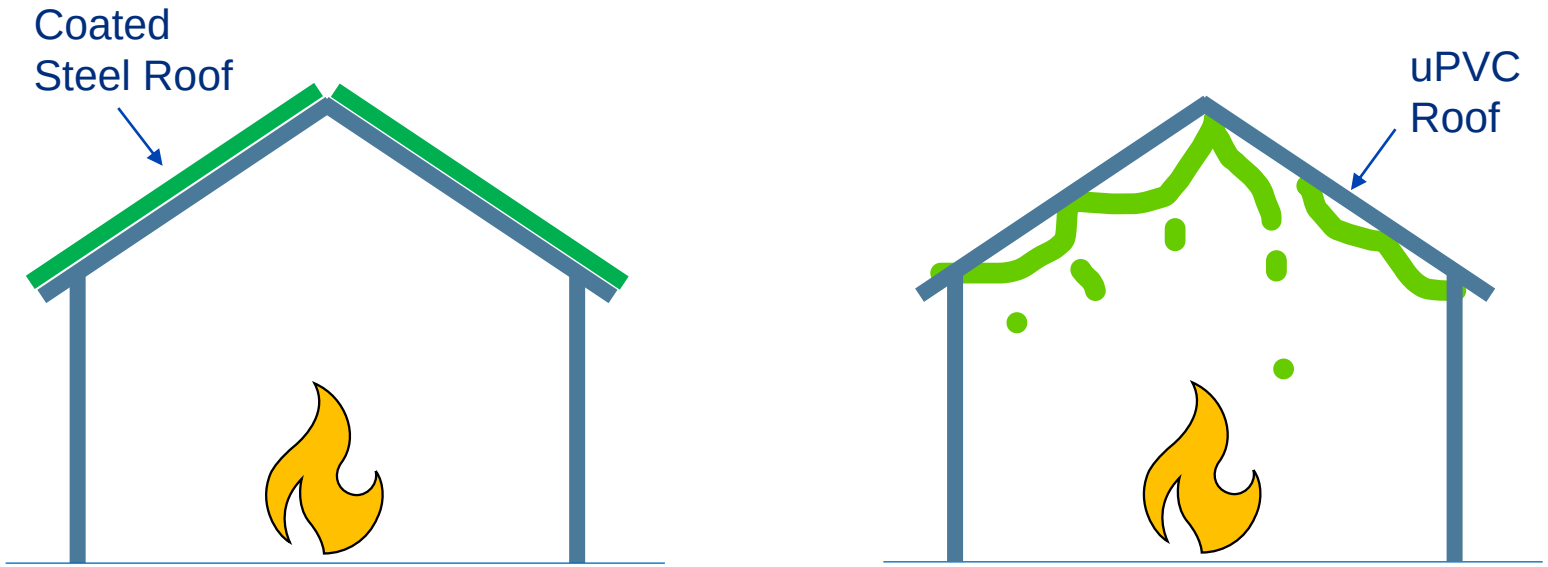
Maximum 2 to 2.5 minutes!

Source [1]: https://www.ul.com/resources/new-challenges-fire-safety-asrs-warehouses
Source [2]: https://www.houstonchronicle.com/news/houston-texas/article/Two-alarm-warehouse-fire-reported-in-northeast-17489615.php
Source [3]: https://strathmorenow.com/articles/watch-sfd-burns-building-down

MELTING AND SOFTENING POINT – COATED STEEL VS UPVC

Material	Softening Point	Melting Point
Coated Steel	500 - 540°C	1,200 - 1,400°C
uPVC	50 - 60°C	150 - 220°C

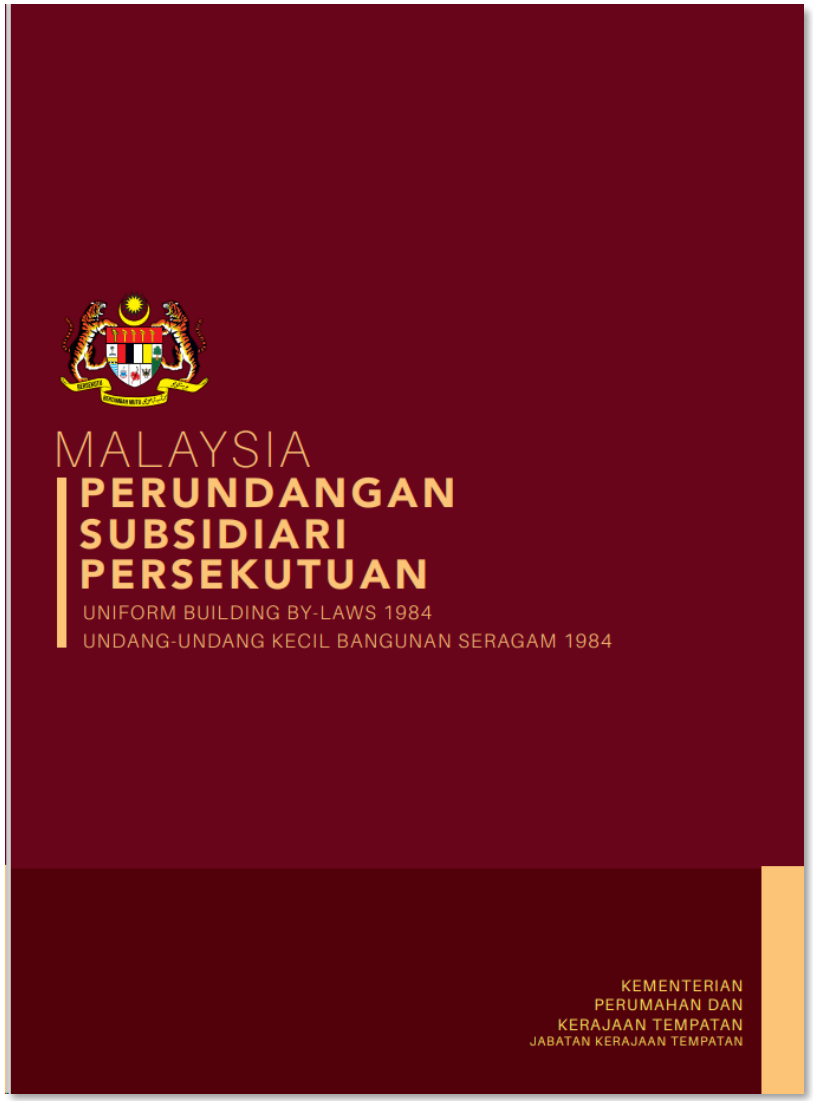
10 Times!



30 seconds to 3 minutes
100°C to 400°C

THEORY VS LAW COMPLIANCES

UBBL REQUIREMENT FOR WALL / CEILING / ROOF



Uniform Building By-Laws 1984 (2022 version)

Uniform Building By-Laws 1984

Class O
Class 1
Class 2
Class 3
Class 4

UBBL, Cl 204: **Wall / Ceiling** must be "Class O" unless otherwise stated.

UBBL, Cl 211: **Roof** must be minimum "Class 1" except building Type I & III as stated in Fifth Schedule.

A) SPREAD OF FLAME CLASSIFICATION REQUIREMENT BY UBBL (WALL / CEILING)

Uniform Building By-Laws 1984 (2022 version), Clause 204:

Kelas O. Permukaan yang tiada kemerebakan api.

(a) Apa-apa sebutan mengenai sesuatu permukaan daripada Kelas O hendaklah ditafsirkan sebagai suatu kehendak supaya–

(i) bahan yang daripadanya dinding atau siling itu dibina hendaklah tidak boleh terbakar seluruhnya; atau

(ii) bahan permukaan itu, atau jika permukaan itu diikat seluruhnya pada suatu substrat, bahan permukaan itu bersama substrat tersebut, apabila diuji mengikut PB 476: Bahagian 6 dan Bahagian 7, hendaklah mempunyai indeks pelaksanaan yang tidak melebihi 6.

Non-Combustible

Passed the test of BS476: Part 4

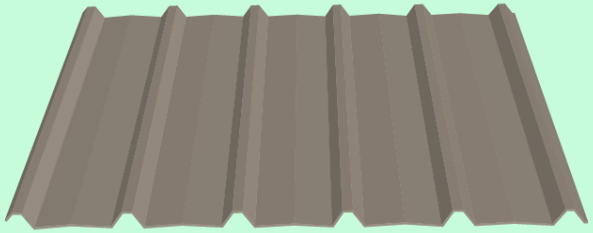
OR

Performance Index, I < 6

According to BS476: Part 6

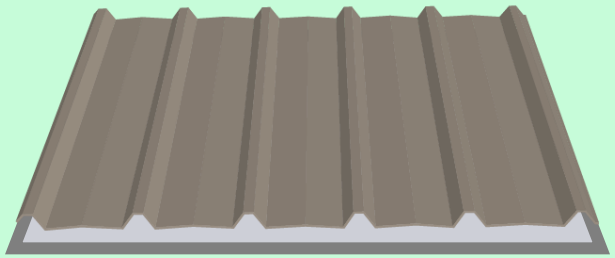
+

Tested according to BS476: Part 7



Single Skin

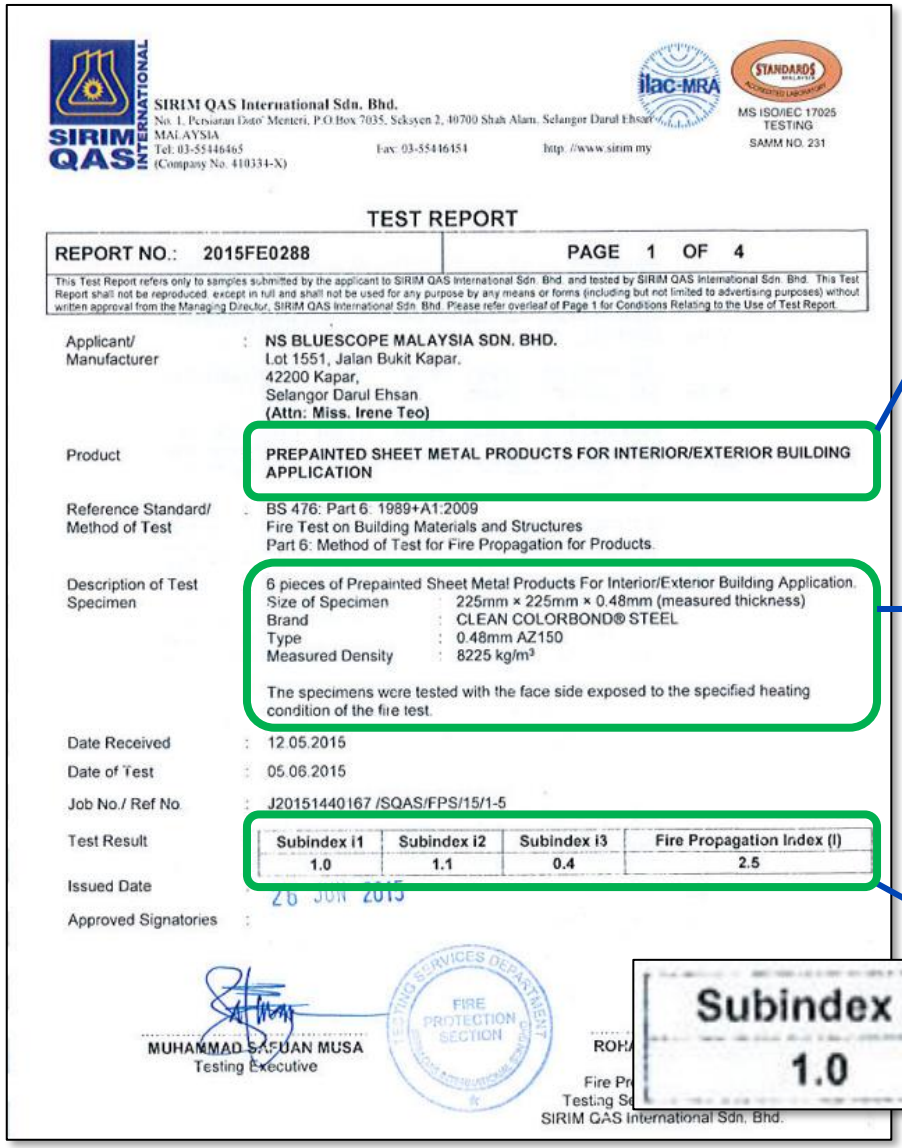
OR



Single Skin with Substrate

"CLASS O" MATERIAL – COATED STEEL (WALL / CEILING)

Example: Test report of BS476: Part 6 from local accredited lab



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 Fax: 03-55446151 http://www.sirim.my (Company No. 410334-X)
MS ISO/IEC 17025 TESTING SAMM NO. 231

TEST REPORT

REPORT NO.: 2015FE0288 PAGE 1 OF 4

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/ Manufacturer	:	NS BLUESCOPE MALAYSIA SDN. BHD. Lot 1551, Jalan Bukit Kapar, 42200 Kapar, Selangor Darul Ehsan (Attn: Miss. Irene Teo)
Product	:	PREPAINTED SHEET METAL PRODUCTS FOR INTERIOR/EXTERIOR BUILDING APPLICATION
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 Prepainted Sheet Metal Products For Interior/Exterior Building Application. Size of Specimen : 225mm × 225mm × 0.48mm (measured thickness) Brand : CLEAN COLORBOND® STEEL Type : 0.48mm AZ150 Measured Density : 8225 kg/m³ The specimens were tested with the face side exposed to the specified heating condition of the fire test.
Date Received	:	12.05.2015
Date of Test	:	05.06.2015
Job No./ Ref No.	:	J20151440167 /SQAS/FPS/15/1-5
Test Result	:	Subindex i1: 1.0; Subindex i2: 1.1; Subindex i3: 0.4; Fire Propagation Index (I): 2.5
Issued Date	:	26 JUN 2015
Approved Signatories	:	

MUHAMMAD SAIFUAN MUSA
Testing Executive

ROHA
Fire Pr
Testing Se
SIRIM QAS International Sdn. Bhd.

Check #1 : Application

PREPAINTED SHEET METAL PRODUCTS FOR INTERIOR/EXTERIOR BUILDING APPLICATION

Check #2 : With / Without Substrate

Colorbond®

6 pieces of Prepainted Sheet Metal Products For Interior/Exterior Building Application.

Size of Specimen	:	225mm × 225mm × 0.48mm (measured thickness)
Brand	:	CLEAN COLORBOND® STEEL
Type	:	0.48mm AZ150 **Single material without substrate**
Measured Density	:	8225 kg/m³

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

Check #3 : Performance Index, I < 6

Subindex i1	Subindex i2	Subindex i3	Fire Propagation Index (I)
1.0	1.1	0.4	2.5

PASS

“CLASS O” MATERIAL – UPVC (WALL / CEILING)

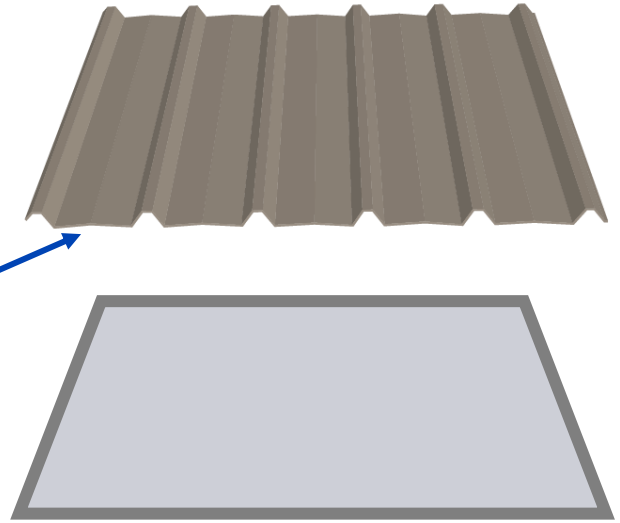
Table 1 – Allowable limits for calibration

Time from ignition of gas, t	Limits for rise above initial temperature
min	°C
3	27 to 39
5	85 to 110
10	175 to 205
20	230 to 260

Extracted from BS476: Part 6: 2009

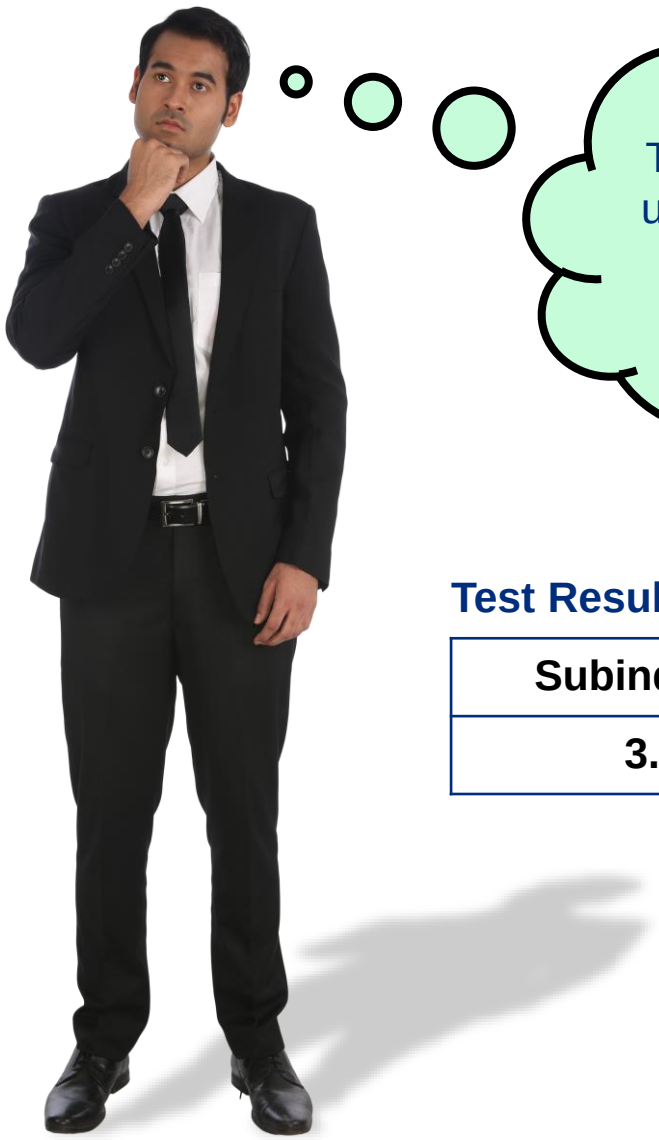
uPVC melting point is 150°C to 220°C, so how uPVC wall / ceiling can pass the BS476: Part 6?

Additional substrate to slow down the heat transfer such as cement board



If uPVC sheets were tested with substrate, the application must be used with substrate too. As such, uPVC sheets shall not be used by itself if it does not pass the Class O criteria.

“CLASS O” MATERIAL – UPVC (WALL / CEILING)



Then it means I still can use uPVC sheet as long as it combine with substrate?

Not really unless the Performance Index (Fire Propagation Index) lower than 6. Otherwise, it may be not complied to UBBL.

Test Result (Example):

Subindex i1	Subindex i2	Subindex i3	Fire Propagation Index (I)
3.9	6.2	2.1	12.2

Failed!

B) SPREAD OF FLAME CLASSIFICATION REQUIREMENT BY UBBL (ROOF)

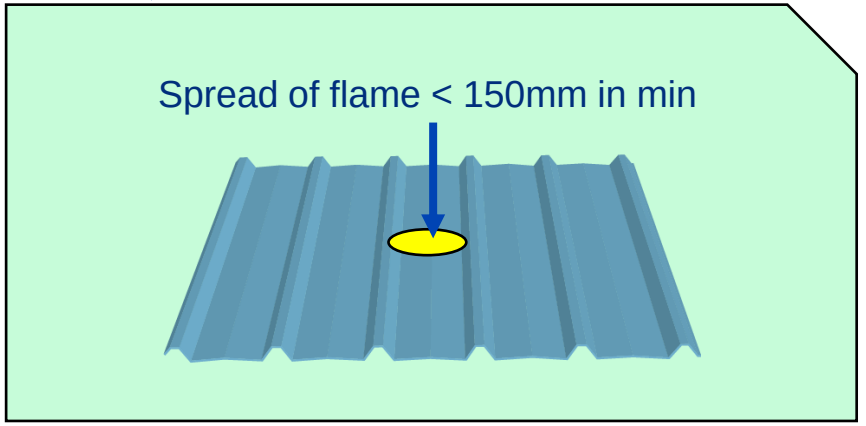
Uniform Building By-Laws 1984 (2022 version), Clause 211:

(1) Suatu permukaan atau bahan bagi penutup bumbung atau pembinaan bumbung hendaklah mempunyai kadar kemerebakan api permukaan tidak kurang daripada Kelas 1, kecuali dalam keadaan Kumpulan Maksud I atau III sebagaimana yang ditunjukkan dalam Jadual Kelima Undang-Undang Kecil ini, dan di dalam suatu bangunan yang dilindungi keseluruhannya dengan suatu sistem semburan automatik

Uniform Building By-Laws 1984 (2022 version), Clause 204:

Kelas 1 . Permukaan yang Amat Kurang Kemerebakan Api.

Permukaan-permukaan yang mana tidak lebih daripada 150 milimeter min kemerebakan api berlaku.



CLASSIFICATION OF SPREAD OF FLAME

Uniform Building By-Laws 1984
Class O
Class 1
Class 2
Class 3
Class 4

Spread of flame classification of building materials according to building laws

≠

BS476: Part 7
Class 1
Class 2
Class 3
Class 4

Spread of flame classification of building materials according to international testing standard

“CLASS 1” MATERIAL – COATED STEEL (ROOF)

Example: Test report of BS476: Part 7 from local accredited lab

SIRIM QAS International Sdn. Bhd.
No. 1, Persiaran Dato' Menteri, P.O.Box 7035, Seksyen 2, 40700 Shah Alam, Selangor Darul Ehsan
MALAYSIA
Tel: 03-55146465 Fax: 03-55446454 http://www.sirim.my
(Company No. 41033-X)

MS ISO/IEC 17025 TESTING
SAMM NO. 231

TEST REPORT

REPORT NO.: 2015FE0287 | PAGE 1 OF 3

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/ Manufacturer	:	NS BLUESCOPE MALAYSIA SDN. BHD. Lot 1551, Jalan Bukit Kapar, 42200 Kapar, Selangor Darul Ehsan. (Attn: Miss Irene Teo)
Product	:	PREPAINTED SHEET METAL PRODUCTS FOR INTERIOR/EXTERIOR BUILDING APPLICATION
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 Prepainted Sheet Metal Products For Interior/Exterior Building Application. Size of Specimen : 270mm × 885mm × 0.48mm (measured thickness) Brand : CLEAN COLORBOND® STEEL Type : 0.48mm AZ150 Measured Density : 8263 kg/m³ The specimens were tested with the face side exposed to the specified heating condition of the fire test.
Date Received	:	12.05.2015
Date of Test	:	06.06.2015
Job No./ Ref No.	:	J20151440168 /SQAS/FPS/15/1-6
Test Result	:	Classification of Surface Spread of Flame Test : Class 1
Issued Date	:	26 JUN 2015
Approved Signatories	:	

HANAFI MOHAMAD
Senior Testing Executive

FIRE PROTECTION SECTION
TESTING SERVICES DEPARTMENT

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

Check #1 : Application

PREPAINTED SHEET METAL PRODUCTS FOR INTERIOR/EXTERIOR BUILDING APPLICATION

Check #2 : With / Without Substrate

Colorbond®

6 pieces of Prepainted Sheet Metal Products For Interior/Exterior Building Application.

Size of Specimen	:	225mm × 225mm × 0.48mm (measured thickness)
Brand	:	CLEAN COLORBOND® STEEL
Type	:	0.48mm AZ150
Measured Density	:	8225 kg/m³

Single material without substrate

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

“CLASS 1” MATERIAL – COATED STEEL (ROOF)

Example: Test report of BS476: Part 7 from local accredited lab

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TEST REPORT

REPORT NO.: 2015FE0287	PAGE 1 OF 3

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HANAFI MOHAMAD
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FIRE PROTECTION SECTION
TESTING SERVICES DEPARTMENT

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

The “Class 1” is not same as the “Class 1” as required by UBBL

Classification of Surface Spread of Flame Test : Class 1

Class 1 :
Spread of flame < 150mm

Table 2. Classification of spread of flame

Classification	Spread of flame at 1.5 min		Final spread of flame	
	Limit	Limit for one specimen in sample	Limit	Limit for one specimen in sample
	mm	mm	mm	mm
Class 1	165	165 + 25	165	165 + 25
Class 2	215	215 + 25	455	455 + 45
Class 3	265	265 + 25	710	710 + 75
Class 4	Exceeding the limits for class 3			

Extracted from BS476: Part 7: 1997

"CLASS 1" MATERIAL – COATED STEEL (ROOF)

Example: Test report of BS476: Part 7 from local accredited lab

REPORT NO.: 2015FE0287 | PAGE 3 OF 3

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Test Results

Product : PREPAINTED SHEET METAL PRODUCTS FOR INTERIOR/EXTERIOR BUILDING APPLICATION

Brand : CLEAN COLORBOND® STEEL
Measured Thickness : 0.48 mm
Type : 0.48mm AZ150
Measured Density : 8263 kg/m³
Date of Test : 06.06.2015

Specimen No.	1	2	3	4	5	6
Spread of flame at 1½ minutes (mm)	0	0	0	0	0	0
Distance (mm)	Time of spread of flame to indicated distance (minutes . seconds)					
75	-	-	-	-	-	-
165	-	-	-	-	-	-
190	-	-	-	-	-	-
215	-	-	-	-	-	-
240	-	-	-	-	-	-
265	-	-				
290	-	-				
375	-	-				
455	-	-				
500	-	-				
525	-	-				
600	-	-				
675	-	-				
710	-	-				
750	-	-				
785	-	-				
825	-	-				
865	-	-				
Time of maximum spread of flame (minutes . seconds)	-	-				
Distance of maximum spread of flame (mm)	0	0				

Conclusion

In accordance with the class definition specified in the standard, the test results show that the sample tested has a Class **One** Surface Spread of Flame.

The test results relate only to the behavior of the test specimens of a product under the particular conditions of test; they are not intended to be sole criterion for assessing the potential fire hazard of the product in use.

26 JUN 2015

PROTECTION SECTION

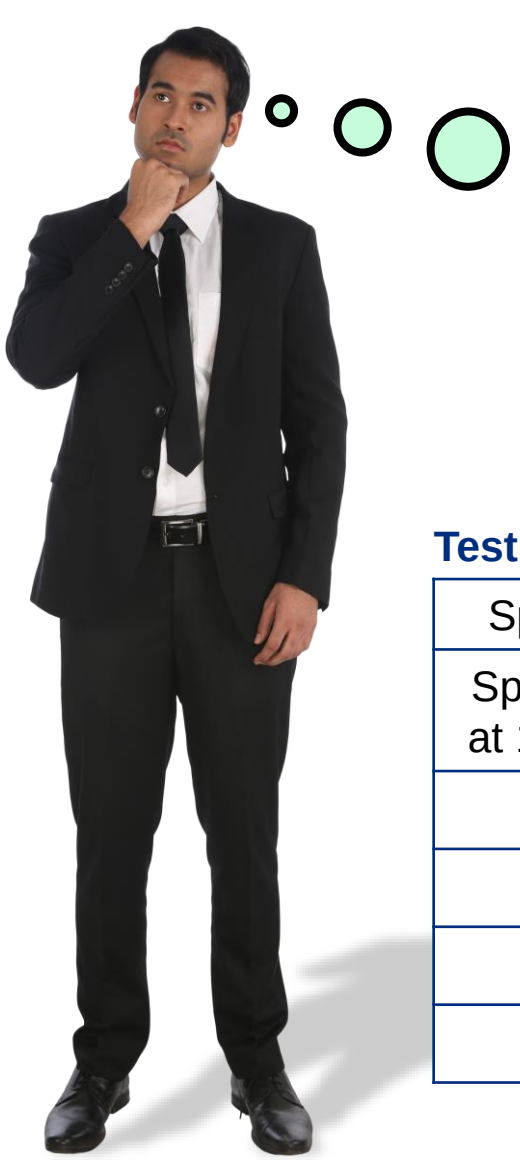
Check #3 : Spread of flame < 150mm

Specimen No.	1	2	3	4	5	6
Spread of flame at 1½ minutes (mm)	0	0	0	0	0	0
Distance (mm)	Time of spread of flame to indicated distance (minutes . seconds)					
75	-	-	-	-	-	-
165	-	-	-	-	-	-
190	-	-	-	-	-	-

PASS

Steel do not spread of flame at all, so it is classified as Class O under UBBL which is higher than Class 1

“CLASS 1” MATERIAL – UPVC (ROOF)



Then it means I still can use uPVC sheet as long as it combine with substrate, and it is Class 1 as shown in testing report?

Not really unless the spread of flame should not be more than 150mm. Otherwise, it may be not complied to UBBL.

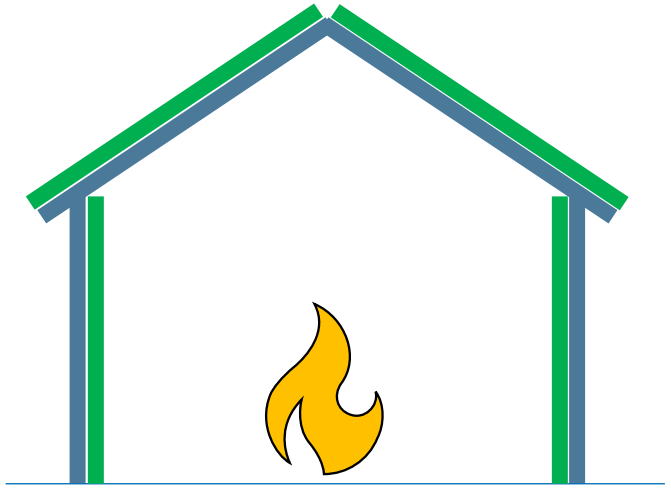
Test Result (Example):

Failed!

Specimen No.	1	2	3	4	5
Spread of flame at 1.5mins (mm)	160	162	165	159	160
Distance	Time of spread of flame to indicated distance (minutes.seconds)				
75	0.50	0.52	0.55	0.48	0.53
165	1.48	1.45	1.49	1.50	1.43
190	-	-	-	-	-

3.0 Toxic Free

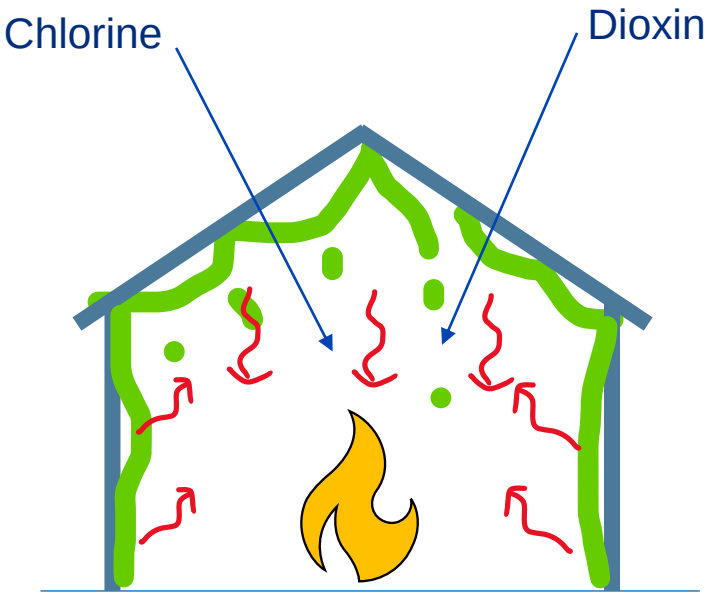
TOXICITY GAS RELEASE DURING BURNING – COATED STEEL VS UPVC



Coated Steel Roof

Do not release toxic fumes during fire

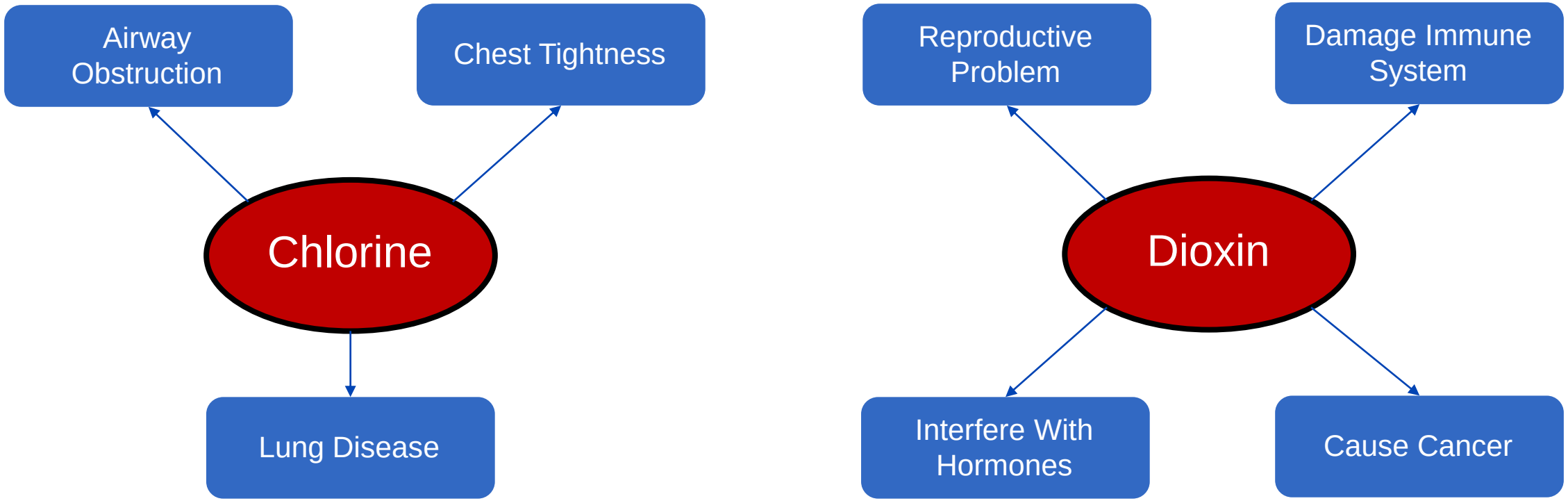
VS



uPVC Roof

Release toxic fumes during fire

HAZARD OF CHLORINE AND DIOXIN



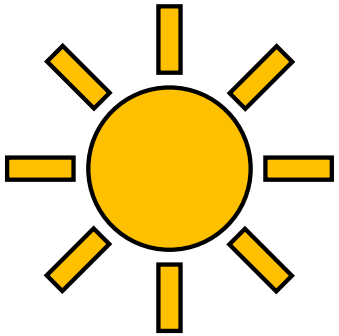
uPVC vs Coated Steel Roof In Achieving the Durability

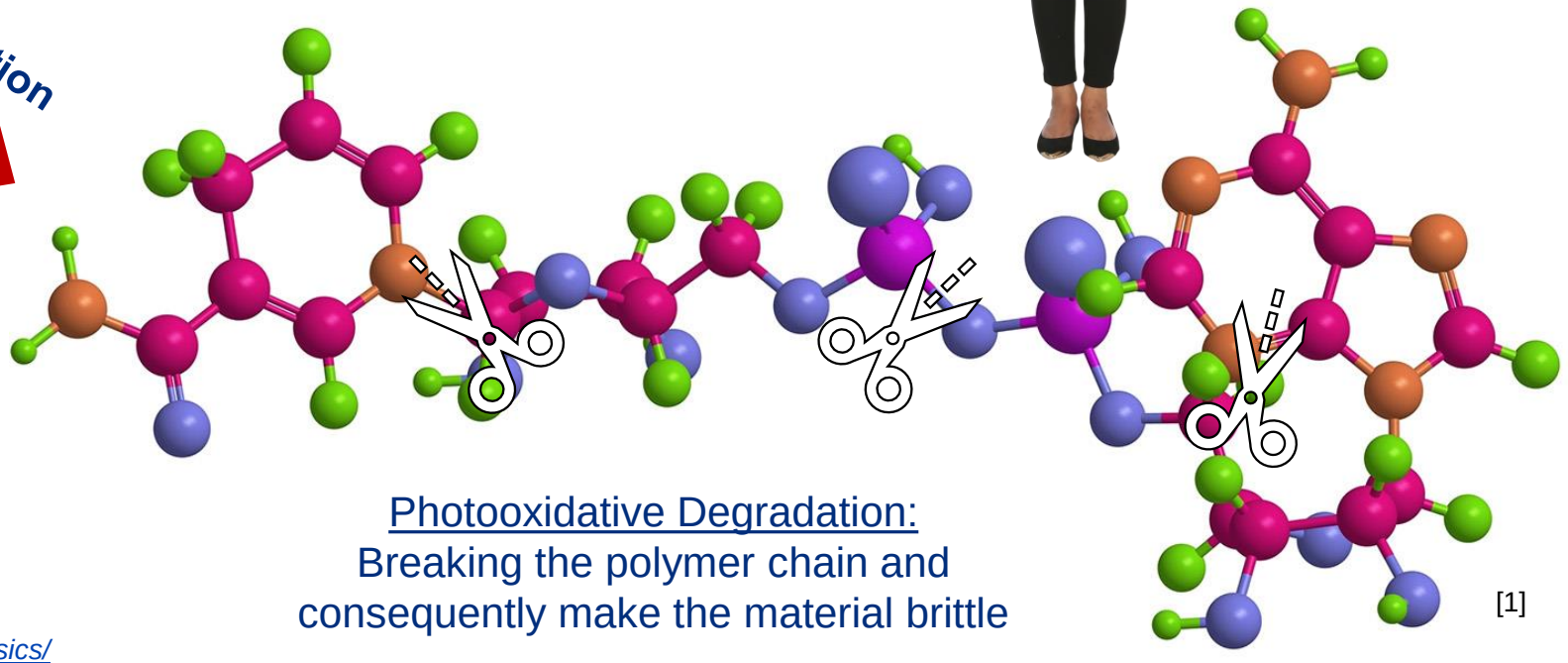
1.0 Long Lasting Material to Reduce The Repairing Frequency

UPVC EXPOSE TO SUNLIGHT

uPVC	=	Polymer
Paint	=	Polymer

1 year? 2 years?
No idea





Photooxidative Degradation:
Breaking the polymer chain and consequently make the material brittle

[1]

Source [1]: https://augustrs.com/about-us/polymer-physics/

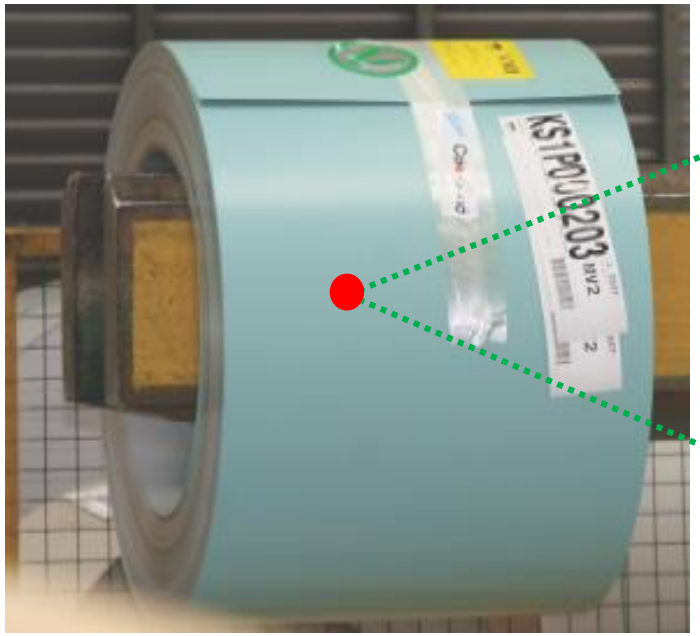
SCENARIOS OF PHOTOOXIDATIVE DEGRADATION HAPPEN

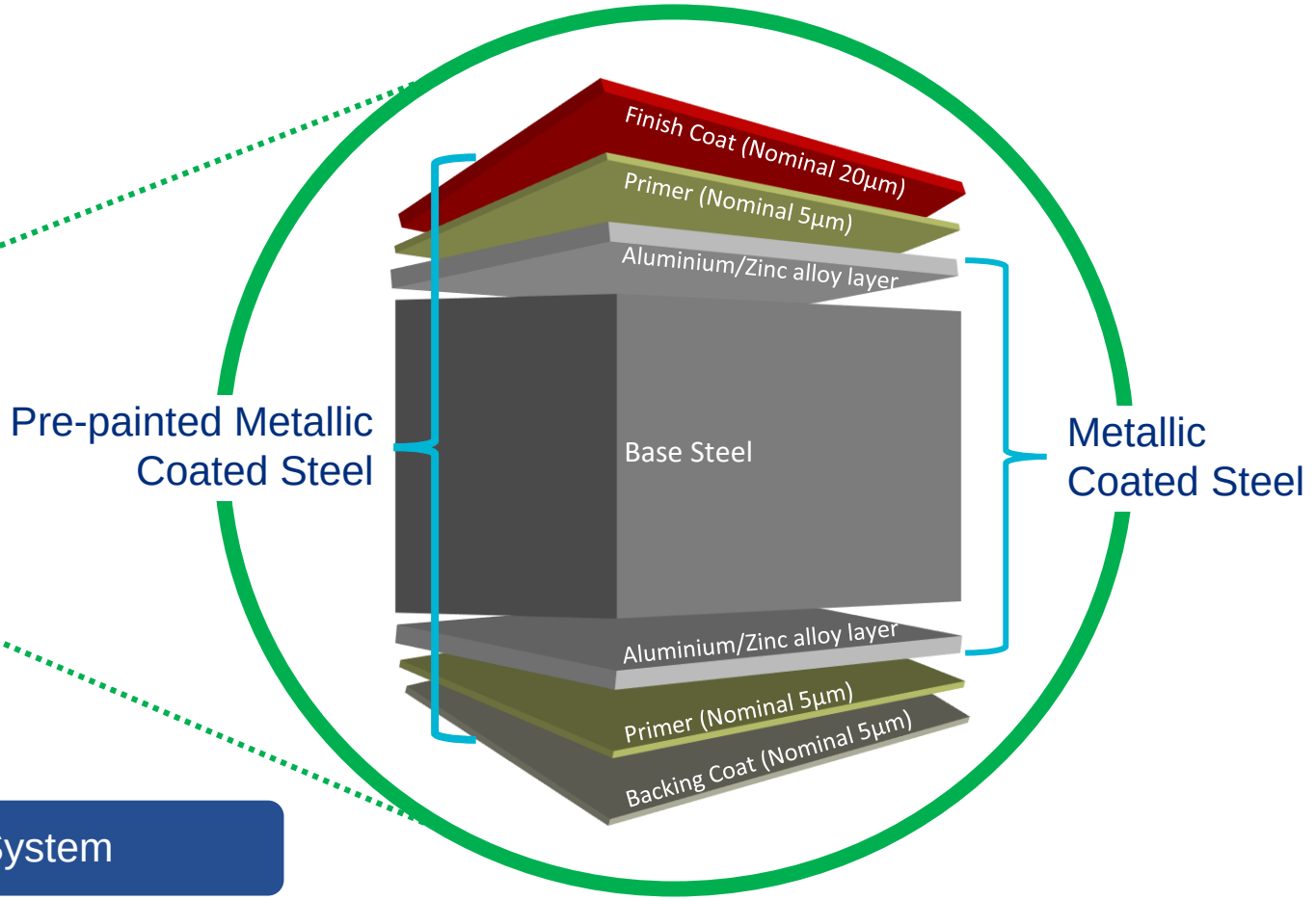
Low capacity in accommodate flexible movement and resist impact load

Discolouration and worst case it is happened unevenly on roof

Source [1]: https://www.facebook.com/100064358034647/videos/1040429946762689
Source [2]: https://www.facebook.com/pamnorthernchapter/videos/714374750491114/ by Swissma Building Technologies S/B
Source [3]: Lavenda Steel S/B

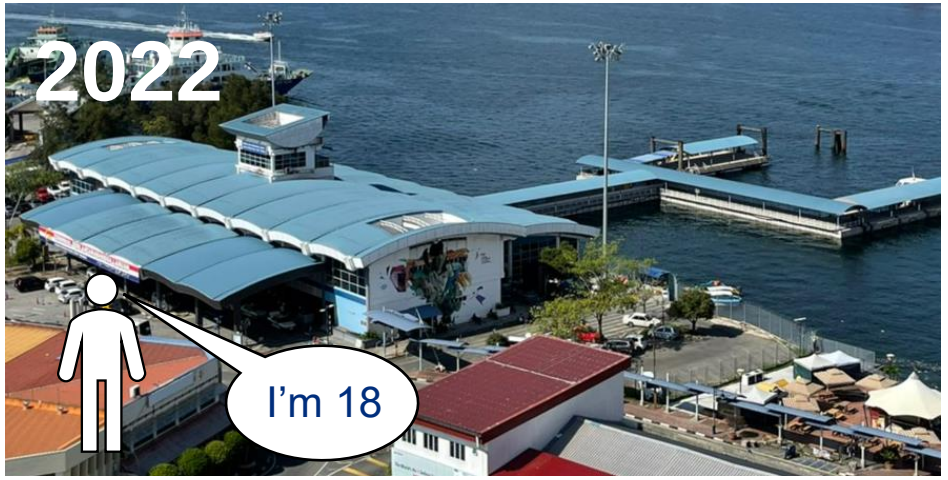
PRE-PAINTED METALLIC COATED STEEL





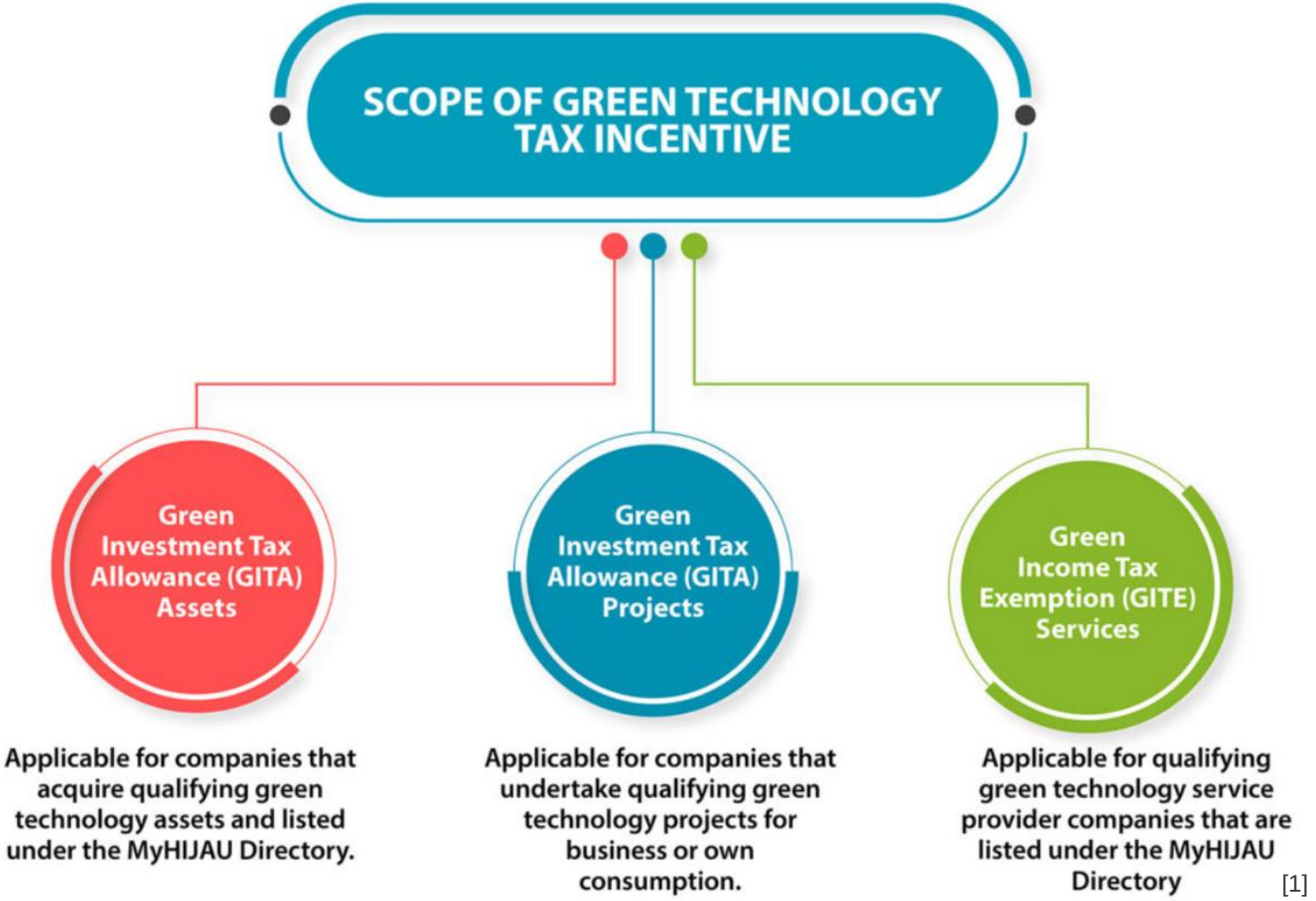
- Superior Coating System
- Primer Technology
- Colour Retention Technology

SUPERIOR CORROSION RESISTANCE & EXCELLENT COLOUR RETENTION



2.0 Capture With New Trends

TREND OF ADOPTING RENEWABLE ENERGY

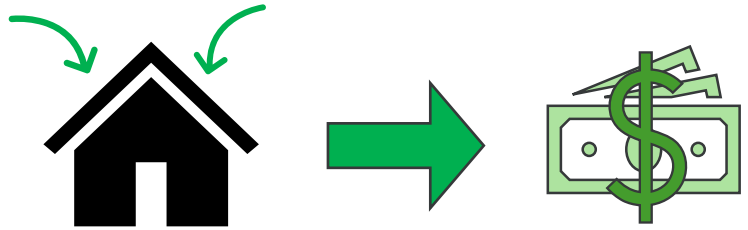


[1]

Introduced in 2014 by Malaysian Investment Development Authority (MIDA) and executed by Malaysian Green Technology and Climate Change Centre (MGTC)

According to Budget 2023, the incentive scheme has been extended to 21 Dec 2025 and the tax allowance and exemptions from three years to five years.

Objective: encourage business or private sectors focus on renewable energy, energy efficiency and energy conservation.

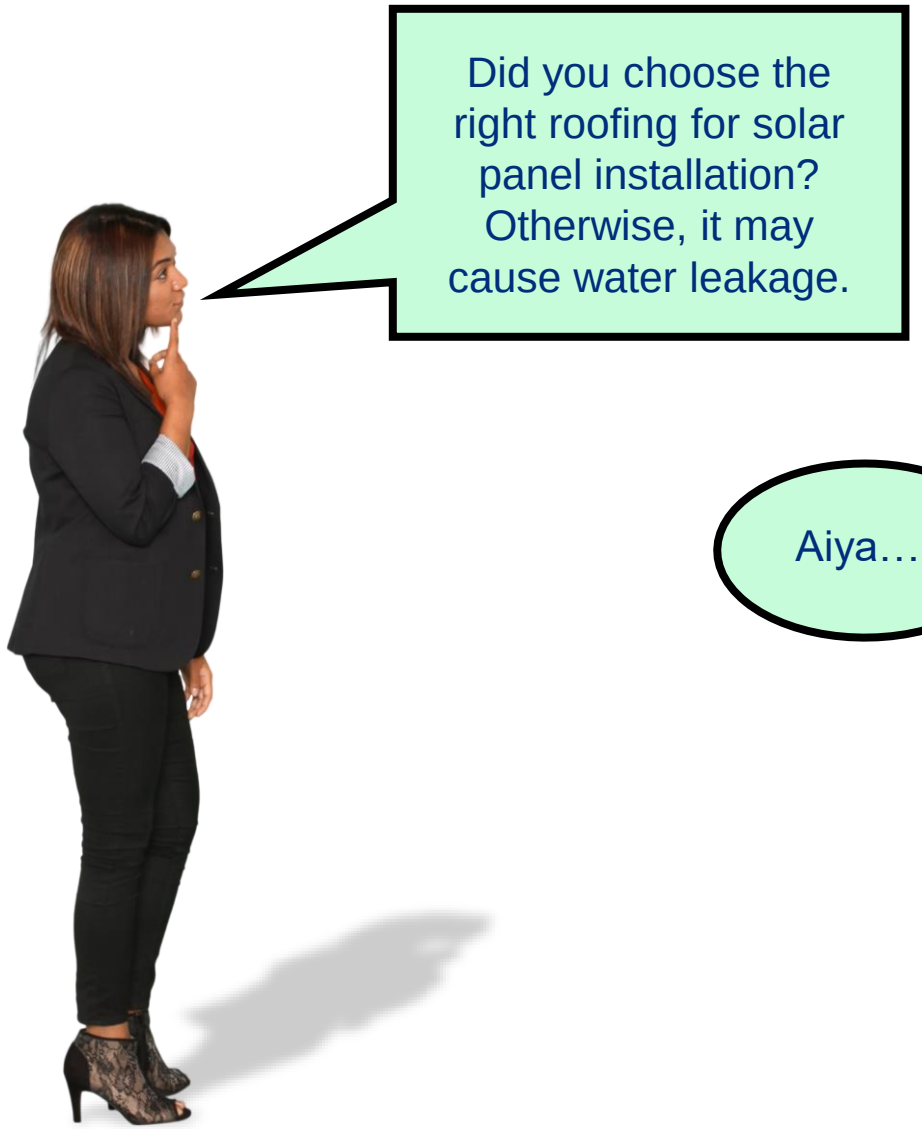


Qualified companies can get 70% income tax exemptions

Source [1]: https://www.mgtc.gov.my/what-we-do/green-incentives/green-investment-tax-incentives-gita-gite/

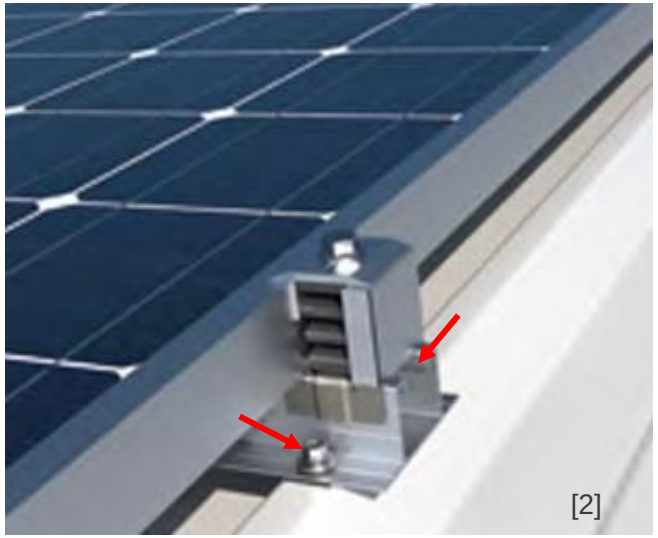
SOLAR PANEL INSTALLATION

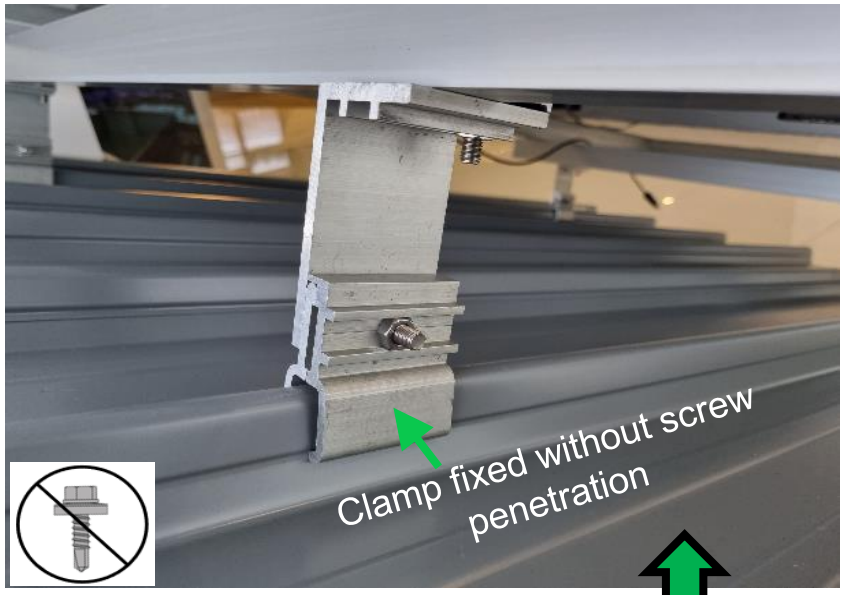
CHOICE OF ROOF FOR SOLAR PANEL INSTALLATION

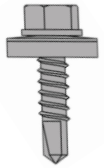


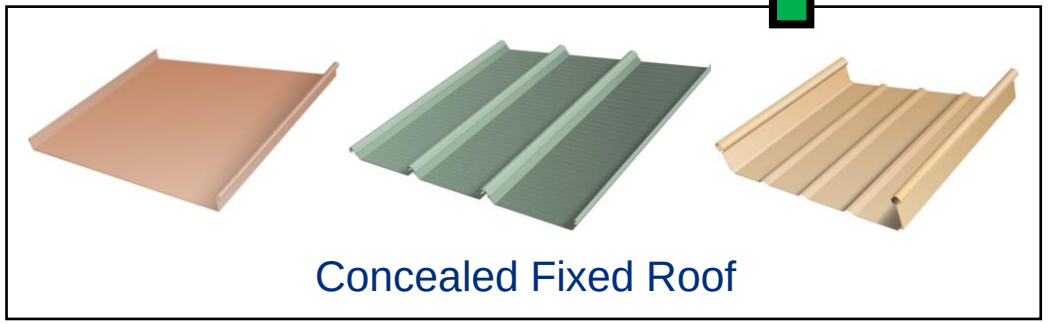
SCREW FIXED ROOF MIGHT NOT BE THE BEST CHOICE


[1]


[2]



More  = High Possibility



Coated Steel

uPVC

Source [1]: https://www.s-5.com/products/solar-panels-on-metal-roof-pvkit-2-0/
Source[2]: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.indexfix.com/uploads/folisf21/folisfen21.pdf

CHOOSE THE RIGHT ROOFING PRODUCT

- Product is made by the right material that can perform rightly in resist loadings
- Product is will not cause possible water leakage that can be avoided
- Product can resist fire spread by itself and pass the UBBL
- Product is made by the right material that is toxic free
- Product is made by the material that is long lasting with proven record
- Product that can help you to catch-up new trend

Q&A

Tell us more!

Thank you for your attendance.

Kindly scan the QR code & fill up the survey form for LAM/BEM CPD points

You may share your questions for our speaker to address through the survey form too.