

COOL EFFECT of Yieh Phui 3C Clean ColorCool

TSR (Total Solar Reflectance)

- For **Yieh Phui 3C Clean ColorCool** products, both lighter and darker color sheets have an average of TSR of 0.25 or above. With solar reflective pigments introduced in **3C Clean ColorCool**, the possible deviation of TSR is up to 1.9~12.0% (by colors) when it is compared with conventional steel sheet.
- 3C Clean ColorCool** products have a surface coating infused with inorganic solar reflective pigments. By reflecting most infrared and visible wavelengths, **3C Clean ColorCool** products achieve cool effects. Cooling efficiency of **3C Clean ColorCool** and of conventional **PVDF** steel sheets are compared as follows:

Item	Yieh Phui PVDF 3C Clean ColorCool	Conventional PVDF coatings
Cool effects (ΔT)	Cool down 3~5°C (by colors)	No cool effects

Remarks:
 (a) Lighter color sheets reflect more sunlight and contribute more cool effects.
 (b) The compared results are evaluated on the modeled house under lab-controlled conditions.

RECOMMENDED END USES

1. Building

3C Clean ColorCool is suitable to be used for roofing and siding in critical environments such as heavily polluted industrial district, petrochemical industrial district and chemical industrial district.

3C Clean ColorCool can be used in any heavily atmospheric-polluted, corroded, freezing and hot environments, and areas under direct solarization, especially for high slope roofing application and large building constructions.

2. Others

3C Clean ColorCool is also suitable to be applied to roofing or walls of building constructions such as high-tech factories (science-based industrial parks), hospitals, and large-scale public buildings (gym, dome stadium, MRT station, hangar, warehouse

store and so forth) where durability and long-term performance are required.

- If installed in/near critical corroded areas such as coastland, power plant, or electric furnace plant, please see "ATTENTION" for more information.

ATTENTION

- Yieh Phui 3C Clean ColorCool** has three categories of substrates which are all suitable to be used in heavily corroded environment; however, ColorEmboss **EV-200 (PVC embossed)** protected by high build film and **High Build PVDF Pre-Painted Steel Sheets** are especially recommended for use in coastland where sea wind carries sand.
- In general, lighter color sheets will reflect more sunlight and darker color sheets will reflect less sunlight. As a true thermal insulated steel sheets, Yieh Phui's darker colors sheets (**3C Clean ColorCool**) can produce a higher performance across roof surface as compared with the lighter color sheets.
- If you have any questions regarding color selection, installations, or specification requirements, please contact Yieh Phui or our distributors.

ATTRACTIVE COLORS of Yieh Phui 3C Clean ColorCool:

Color	Silver Gray	Pearl Silver	Ocean Blue	Tung Blossom White
Initial Reflectance (%)	≥ 25	≥ 47	≥ 25	≥ 60
Solar Reflectance Index	24	53	24	71
Cool Effect ($\Delta T, ^\circ C$)	4.7	4.4	4.0	3.9

Color	Nexus Blue	Wasabi Green	Solaris Yellow	Urgan Beige	Cosmic Grey
Initial Reflectance (%)	≥ 72	≥ 68	≥ 68	≥ 69	≥ 66
Solar Reflectance Index	87	81	81	84	78
Cool Effect ($\Delta T, ^\circ C$)	4.6	4.3	4.2	4.4	4.2

Remarks: 1. Above values are for reference only.
 2. Other colors are available subject to inquiry.
 3. Solar Reflectance Index (SRI) values are derived from a calculation in ASTM E1980.

3C Clean ColorCool™ is a registered trademark of **Yieh Phui**.
KYNAR500® is a registered trademark of Elf Atochem North America, Inc.
HYNAR5000® is a registered trademark of Ausimont USA Inc.



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Distributor

2012.07



Finest Steel at Yieh Phui

Yieh Phui PVDF Clean ColorCool™ (3C) Pre-Painted Steel Sheets

YP-3C-2012E1



3C Clean ColorCool™ 3CVF-20

3C Clean ColorCool™ 3CVF-20F

3C Clean ColorCool™ 3CVF-20L

Yieh Phui PVDF Clean ColorCool™ (3C) Pre-Painted Steel Sheets

DESCRIPTION

1. **Yieh Phui PVDF Clean ColorCool™ (3C) Pre-Painted Steel Sheets** include three products. They are 3C Clean ColorCool 3CVF-20, 3C Clean ColorCool 3CVF-20F, and 3C Clean ColorCool 3CVF-20L. These three products adopt hot-dip Zinc, 5% Al-Zn alloy, and 55% Al-Zn alloy coated steels as substrates respectively.

Yieh Phui PVDF Clean ColorCool™ (3C) Pre-Painted Steel Sheets, a multifunctional steel product, use Fluorocarbon resin with over 70% of KYNAR500® or HYNAR5000® as top coat that provides exceptional dirt staining resistance (Clean), good thermal insulation (Carbon Reduction), and Corrosion Resistance.

2. **Yieh Phui PVDF Clean ColorCool™ (3C) Pre-Painted Steel Sheets** use Polyvinylidene Fluoride resin, abbreviated to PVDF also known as Fluorocarbon. **Yieh Phui** uses VF standing for PVDF resin. With the latest innovations in polymer technology and advanced formula, due to its superior hydrophilic property, dirt particle buildups on the surface of 3C Clean ColorCool can be washed away by rainfall or regular cleaning. The pleasing appearance of 3C Clean ColorCool can be easily maintained.

3. In order to reflect solar radiation more effectively, solar reflective pigments are introduced into PVDF resin to achieve heat reducing, energy saving and carbon reducing.

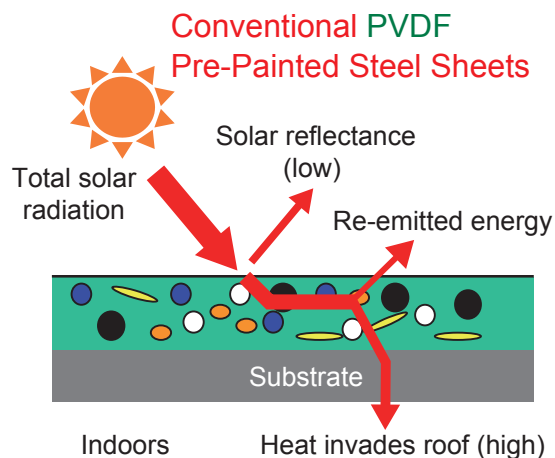
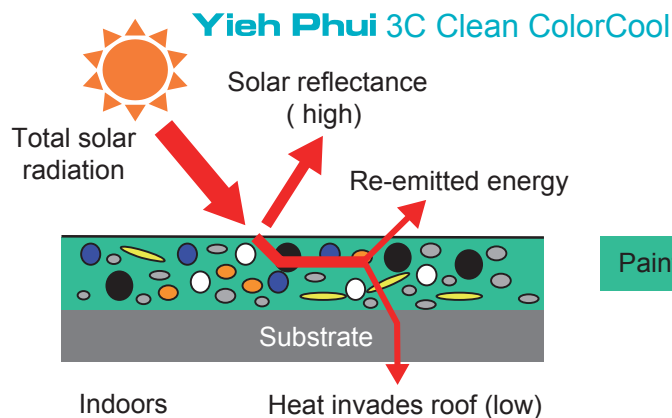
Yieh Phui 3C Clean ColorCool PERFORMANCE

Yieh Phui PVDF Clean ColorCool™ (3C) Pre-Painted Steel Sheets provide better weather resistance, corrosion resistance, chemical resistance, solvent resistance, heat resistance, ultraviolet resistance, anti-staining characteristic, good formability and color retention. Being exposed to normal atmospheric conditions, its service life can be expected up to 25 years⁽¹⁾. With the increased demand for pleasing appearance of a building, a special formula to resist dirt buildup is added into the resin. Additionally, energy conservation and CO₂ emission reduction have become a trend worldwide due to the increased concern about global warning. Yieh Phui has developed the multifunctional and environmentally friendly **Yieh Phui 3C Clean ColorCool** steel sheets to meet the demand.

Note (1):

The life span of **Yieh Phui PVDF Clean ColorCool (3C) Pre-Painted Steel Sheets** depends on individual atmospheric conditions. For more information, please contact our sales representatives or Customer Technical Service Division.

FUNCTION of 3C Clean ColorCool



Remarks: The above profiles are not scaled according to the actual proportion.



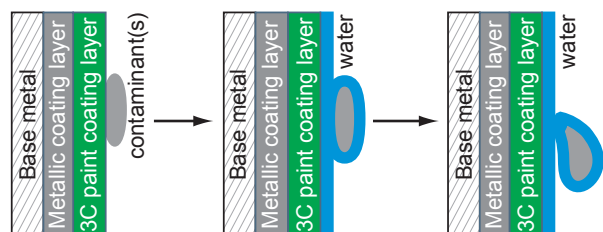
CLEAN EFFECT of **Yieh Phui 3C Clean ColorCool**

1. Anti-Staining Test:

Anti-staining test (see Item 3 below) is carried out for color difference assessment. The result shows that **Yieh Phui 3C Clean ColorCool** has a delta E of less than 1.3; however, the conventional PVDF has a delta E of greater than 2.5. Compared with the conventional PVDF, **Yieh Phui 3C Clean ColorCool** has better anti-staining performance.

Remarks: The higher the delta E, the greater the color difference is.

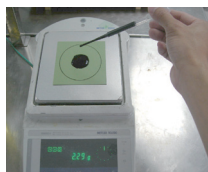
2. FUNCTION of Rainfall on **Yieh Phui 3C Clean ColorCool**



The contaminants such as dust and dirt can be easily removed by rainfall.

Remarks: The above profiles are not scaled according to the actual proportion.

3. Anti-Staining Test-- A. Test Method



A.1 Drop 10g solution (carbon pigments/water = 1:9 by weight) on a circle specimen with a diameter of 8.3 cm.



A.2 Store the specimen in the oven at 80°C for an hour. Then, take it out.



A.3 Clean the specimen with water and gauze it after cooling.



A.4 Measure delta E, and compare it with its delta E value measured prior to the testing.

3. Anti-Staining Test-- B. Test Result

Yieh Phui 3C Clean ColorCool is compared with conventional PVDF steel sheets as follows:

Color		Silver Gray	Pearl Silver	Ocean Blue	Tung Blossom White	Nexus Blue	Wasabi Green	Solaris Yellow	Urban Beige	Cosmic Grey
Conventional PVDF Steel Sheets	Initial	15.8	47.2	20.5	60.4	68.2	64.1	63.2	66.4	63.9
	Result	11.4	44.6	14.8	49.6	54.3	49.8	50.1	54.1	49.1
	ΔTSR	4.4	2.6	5.7	10.8	13.9	14.3	13.1	12.3	14.8
	ΔE	2.8	2.5	3.4	5.6	10.6	13.8	9.3	9.7	13.1
Yieh Phui 3C Clean ColorCool	Initial	27.8	49.3	27.9	62.3	72.2	68.6	68.8	69.9	66.9
	Result	27	47.2	26.8	61.7	70.1	68.1	68.6	68.8	66.4
	ΔTSR	0.8	2.1	1.1	0.6	2.1	0.5	0.2	1.1	0.5
	ΔE	0.8	1	1.1	1.3	0.6	0.5	0.8	0.4	0.5

Note: TSR=Total Solar Reflectance; ΔE=Color Difference

3. Anti-Staining Test-- C. Test Results

(1) Color difference (ΔE)

Yieh Phui 3C Clean ColorCool has better anti-staining performance than conventional PVDF steel sheets.

Remarks: The higher the delta E, the greater the color difference is.

(2) TSR difference (ΔTSR)

Yieh Phui 3C Clean ColorCool has less ΔTSR changes than conventional PVDF steel sheets.

Remarks: The less the ΔTSR changes, the better cool effect it maintains.

