

Safe life by utilizing antibacterial and antiviral PVC products!

2020 December 16

Vinyl Environmental Council

- In the COVID-19 crisis, many people are seeking antibacterial and antiviral products to prevent contact infections in healthcare and welfare facilities, commercial facilities, and non-residential facilities such as offices.
- PVC materials are widely used in building materials such as flooring, wallpaper, decorative sheets, and partitions, as well as in everyday products such as stationery, bags, and sundries. In particular, for products that are easy to come into contact with, manufacturers are focusing on expanding PVC products that are endowed with antibacterial and antiviral functions.
- Because flexible PVC film is made of a soft material and easily follows curved shapes, it is also used for door handles, handrails, and switch buttons.
- It is expected that the use of antibacterial and antiviral products in various applications, such as medical and welfare facilities and commercial facilities, will eliminate the anxiety caused by infection.

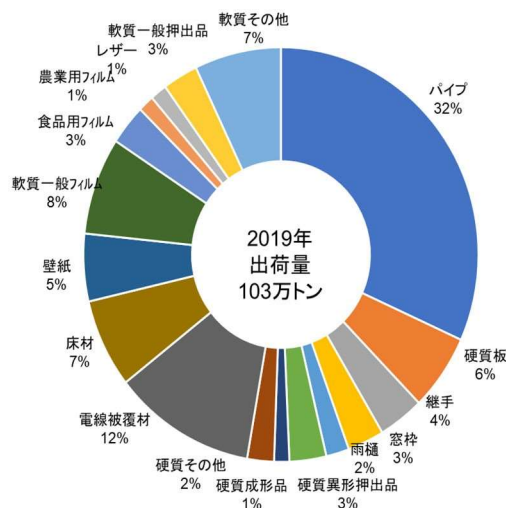
1. PVC Market and Recent Trends

Domestic demand for PVC is 1,030 k-tons in 2019, of which pipe (32%), fitting (4%), window frame (3%), rain gutter (2%), flooring (7%), wallpaper (5%), and other building materials account for about 60%, and PVC products are the most commonly used in plastic building materials.

With the expansion of new-type coronavirus infectious diseases since the beginning of this year (2020), places where many people gather, such as commercial facilities, medical and welfare facilities, offices, traffic-related facilities, and educational facilities, are said to have a high risk of infection, and prevention of infection and hygiene measures by splashing and contact have become important problems. In face-

to-face operations such as registration and service counters, PVC products are used to prevent splashing, such as clear partition sheets for preventing splashing, and panels for preventing splashing (such as stand-legged partitions) for partitioning between neighboring seats such as eating, drinking, and offices.

On the other hand, there is a growing demand for antibacterial and antiviral products when measures to prevent contact infections are required. To meet this need, manufacturers of interior materials such as flooring, wallpaper, decorative sheets, and



出典：塩ビ工業・環境協会資料より作成

Figure 1. Demand of domestic PVC resins (2019)

partitions, and daily supplies such as stationery, bags, and sundries are developing and placing on the market products that have antibacterial and antiviral properties, and are focusing on expanding their products.

2. About the Antiviral Processing SIAA Marking System

The symbol mark, which was established by The Society of International sustaining growth for Antimicrobial Articles (SIAA) to comply with the quality and safety standards as an antimicrobial and mold-proof processed product, is called SIAA Mark. Based on the results of evaluation tests in accordance with ISO 22916 (Antimicrobial Performance Test) and ISO21702 (Antiviral Performance Test) for antimicrobial performance, labels are displayed for products that have been quality controlled and published in accordance with the Guidelines of the Council*1.

Compared to the surface of unprocessed products, antibacterial products have an antibacterial performance that inhibits the growth rate of bacteria to less than 1/100 of that of unprocessed products. On the other hand, antiviral processed products have antiviral performance that reduces the number of specific viruses adhering to the film by 99.99%.

SIAA Mark System for Antimicrobial Processing has been in operation since 1998 for over 20 years, but SIAA Mark System for Antiviral Processing began operating in July 2019 last year.

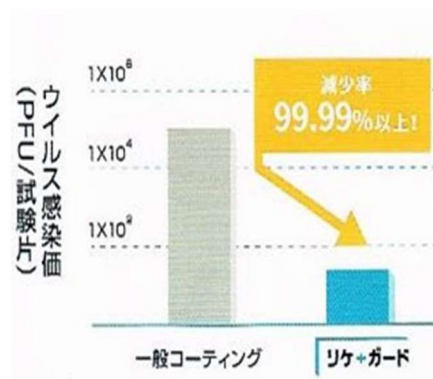


Figure 2. Performance evaluation results of antiviral sheets against viruses with envelopes (measured after 24 hours of storage in the dark at 25°C). Source: Company R

3. Efforts by PVC material manufacturers

In 2015, R Ltd., a PVC compound manufacturer, made full-scale efforts to develop products to prevent infectious diseases against the backdrop of infection problems such as norovirus and O157, and sought to enhance antiviral products. In September 2019, in line with the commencement of the operation of SIAA Mark for Antivirus Processing, the Company acquired the first SIAA Mark for antivirus and antimicrobial processing for PVC film products in Japan and launched it on the market. In addition, the sales of antiviral PVC sheets at general stores (drug stores, etc.) for general consumers*2 has started.

L and To Ltd., both manufacturers of vinyl floor sheets, have been commercializing antibacterial products for some time, but they have also begun commercializing a full range of anti-viral vinyl floor sheet products (specifications).

As a result of the expansion of the new type of coronavirus infection, more and more companies are getting SIAA mark for anti-viral and anti-bacterial anti-viral PVC sheet and other



Figure 3. Anti-viral PVC sheet from R.



Fig. 4.L. Example of antiviral vinyl floor sheet



Figure 6.Example of construction of antiviral PVC sheet by Sy (window frame of hospital)



Figure 5.Sy's anti-viral PVC mask case



Figure 7.O Book cover with antiviral PVC sheet (left), porch partition (right)

products in order to contribute to countermeasures against contact infection. In addition to the company R Ltd., for example, Company L is a general film in March 2020, Company Sy is a mask case, handle cover, vinyl sheet for building materials, etc. in May 2020, Company O is a general film for sundries and stationery in September 2020, Company Tp is a decorative sheet made of vinyl chloride for walls and furniture in September 2020, Company D is a non-flammable vinyl chloride wall material in September 2020, and Company A is a furniture, shoes, and stationery, etc. in October 2020.*³



Figure 8.Example of construction of Tp's antiviral vinyl decorative sheet



Figure 9.D. Antiviral PVC Wallpapers

4. Characteristics of antiviral PVC products

The anti-viral flexible PVC sheet is flexible, so it is easy to follow the curved shape, and can be utilized in various situations such as a door handle, a handrail, a handset of a phone, a switch and a button in a home, and can be used for a wide variety of areas where human hands come into contact, such as an elevator, a button on a ticket vending machine, and an outlet of a commodity of a vending machine. The construction method is also simple, so you can cut it to the required size with scissors, peel off the release paper (base paper) and stick it to the target place.



Figure 10. Image of construction of an antiviral vinyl floor sheet from To



Figure 11. Example of construction of anti-viral PVC wallpaper by Se

With respect to vinyl floor sheets, each company's proprietary antiviral processing technology is designed to exert an effect and antibacterial property to inhibit the activity of viruses when specific viruses and bacteria adhere to the surface of the floor sheet. The antifouling coating layer contains highly antiviral and antibacterial ingredients, and this antifouling coating layer forms a uniform layer, so it is also a major feature that the effect can be expected for a long period of time.

In recent years, no-wax vinyl floor sheets have become popular, mainly in non-houses such as medical and welfare facilities and educational facilities, and products that have imparted antiviral performance to them have been put on the market. In addition, antiviral applications are expected to accelerate for interior materials such as wallpapers and tile carpets, and furniture applications using PVC leathers such as sofa.



Figure 12. Example of furniture using an antiviral PVC leather from Si

5. In the future

The COVID-19 crisis has led to an increasing demand for antiviral and antimicrobial products (transparent vinyl films, sheets, and vinyl floor sheets) in healthcare and welfare facilities, commercial facilities, offices, and other non-residential facilities where many people gather. We have heard from PVC sheet manufacturers that inquiries for antiviral, antimicrobial films, sheets, vinyl floor sheets, and decorative sheets have increased since 2020 summer. Demand in the new housing, renovation, and non-housing sectors is expected to grow in earnest from next year onward.

In order to look at demand trends related to anti-splash sheeting and antiviral PVC products, we used VEC's monthly release statistics for PVC. Figure 13 shows the trends in shipments of the main applications over the year, with October 2019 as 100. From March to May, when the effects of the new type of coronavirus began to appear, shipments of general films temporarily increased due to demand for anti-splash sheets. Overall, however, demand for PVC declined to around 10%, bottoming out in August, and has been on a gradual recovery trend since then. Shipments of antiviral PVC sheets have not yet been contributed, but shipments of building materials and general films in October have gradually returned to the level of the same month of the last year. Going forward, we expect this level of demand to continue for some time, although it will be more of a function of public works and housing demand.

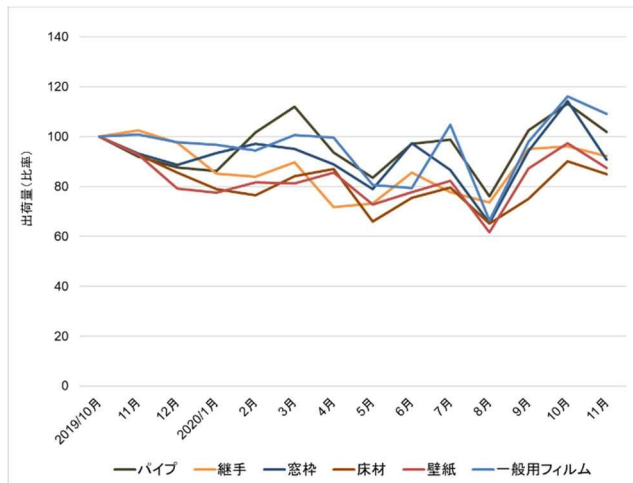


Figure 13. Trends in domestic vinyl chloride resin shipments

(Building materials and general films, etc.)

*2019 Labeled October as 100%.

VEC hope that the widespread use of antiviral and antimicrobial PVC products in residential and daily life, such as residential house, office, commercial, and medical and welfare facilities, will help eliminate the anxiety about infections.

※1) In the "Voluntary Standards for Quality and Safety" by SIAA, the antiviral performance of antiviral processed products is determined by testing with viruses by ISO21702. In addition, safety standards for antiviral processing agents are established based on four types of safety tests, including acute oral toxicity.

※2) Antiviral processing is effective in reducing the number of specific viruses on your product and is not intended to prevent or treat diseases.

※3) Reference Information on Antiviral PVC Products

R Company: Commercialized antiviral film newly 2020.2.14
<https://www.rikentechnos.co.jp/information/2020/02/14/20200214-1/>

R Company: Sold antiviral and antimicrobial films and soft types from July 2020.6.30
<https://www.rikentechnos.co.jp/information/2020/06/30/20200630-1/>

L Company: antiviral no-wax vinyl bed sheet
<https://www.lonseal.co.jp/technology/anti-virus/>

To Company: Starting Antiviral Response of Vinyl Flooring Materials 2020.11.16
<https://www.toli.co.jp/newsrelease/news20201116.html>

Sy Company: Antiviral Functional Building Material "Virus Guard LP" 2020.6.26
https://www.sanyo-ltd.com/dcms_media/other/200626virusugadoLP.pdf

Tp Company: The first cosmetic sheet for antiviral and antimicrobial processing in the country

has obtained SIAA certification. 20/09/02
https://www.toppan.co.jp/news/2020/09/newsrelease_200902.html

Tp Company: Developed polyvinyl chloride decorative sheet for antiviral and antibacterial processing 2020.10.6
https://www.toppan.co.jp/news/2020/10/newsrelease_201006_2_.html

D Company: SIAA (Antiviral) Certification for Olefin Sheet for Building Materials 2020.9.8
https://www.dnp.co.jp/news/detail/10158575_1587.html

D Company: Expanded SIAA certification for antimicrobial and antiviral performance 2020.11.9
(Two types of non-flammable PVC wall materials and quasi-non-flammable olefin wall materials are added.)
https://www.dnp.co.jp/news/detail/10158790_1587.html

O Company: Antimicrobial/Antiviral PVC Films V Buster Launched 2020.11.17
<https://www.okamoto-inc.jp/assets/files/2321>

Si Company: Anti-virus leather Barricade 2020.11.12
<https://www.sincol-n.co.jp/?p=2572>
<https://www.o-sincol.co.jp/news/107009/> <https://www.sincol-material.jp/>

Sg Company: Antiviral wallpaper
https://contents.sangetsu.co.jp/digital_book/faith20/?_ga=2.188798059.1957356681.1607594775-1896489720.1551395417#page=117