

【The English translation of Bepop standard vinyl (indoor use) technical datasheet】

100mm (4in) / 200mm (8in) width

Color	100mm(4in) width	200mm(8in) width
Black	SL-S111N Black	SL-S201N Black
White	SL-S112N White	SL-S202N White
Red	SL-S113N Red	SL-S203N Red
Blue	SL-S114N Blue	SL-S204N Blue
Yellow	SL-S115N Yellow	SL-S205N Yellow
Green	SL-S116N Green	SL-S206N Green
Applicable Bepop machines	CPM-100/100H/100G3/100HG3 series and PM-100A	CPM-200G Series

*These are the vinyl for MAX Bepop Cutting/printing machines. We have 100mm (4in) and 200mm(8in) width models available in North America.

【Material and appearance】

Subject		Unit	Content	Remarks
Material	Face		PVC	
	Adhesive		Acrylic adhesive	
	Release liner		Double sided polyethylene-laminated separator	Fine paper, polyethylene and silicone
Thickness	Face	Micro meter	100	
	Adhesive	Micro meter	23	

Product	100mm (4in) width vinyl	200mm (8in) width vinyl
Width X Length	106mm x 10m/roll (4.17in x 32.81ft)	206mm x 10m/roll (8.11in x 32.81ft)
Release Liner	130mm x 10m/roll (5.12in x 32.81ft)	230mm x 10m/roll (9.06in x 32.81ft)
Maximum printing/cutting width	100mm (3.94in)	200mm (7.88in)

【Performance】

*The following test results are applied for 100mm (4in)/200mm(8in) vinyl.

A. Adhesive force

Subject	Unit	Data	Test Method
Adhesive force	N/25mm(gf/25mm)	Over 5.9 (over 600)	In accordance with JIS Z 0237
“Ball-tack” measuring	1/32”	Over 8	
Retention	mm/1hour	Over 1	

B. Adhesive characteristics

Test Method	Applied 25mm width label of each vinyl ("label") to various kinds of material (smooth and flat plates), at the normal room temperature. Then left the samples for a time being. After that, measured the adhesive force when peeling the samples off at 180 degree angle. (In accordance with JIS Z 0237, testing method of adhesive tape.)					
Result and Note	The adhesive force to most of the material, such as Stainless-steel plate, Sheet glass and Acrylic plate is more than 5.9N/25mm. However, the adhesive force to polyethylene plate, to which the adhesive is hardly adhered well in general, is 0.9N/25mm. Only this is much less than the other material.					
Summary data	Applied material	Stainless steel	Sheet glass	Painted steel	Aluminum	Acrylic plate
	Adhesive force	6.7	7.9	6.4	7.1	9.7
	Applied material	Polyethylene	PET	Polyacetal	PVC	Polycarbonate
	Adhesive force	0.9	6.5	6.2	15.6 *	10.0
*There might be a residue of the adhesive, when the vinyl is peeled off.						

C. The characteristics under the high temp. / low temp.

Test Method	Applied the 25mm width label on stainless steel, sheet glass and painted metal pipe, at normal room temperature. Then exposed it to high and low temperatures. Finally, observed the changes of the vinyl, after the specified duration.
Result and Note	<p><Stainless-steel plate> When the applied labels were exposed to the extremely high temperature and low temperature, no discoloration and no deformation of the edge was observed. When the applied labels were exposed to the extremely high temperature (over 100 deg. Celsius), after the removal of the label, there were a certain residue of the adhesive remained on the applied surface.</p> <p><Sheet glass> When the applied labels were exposed to the extremely high temperature and low temperature, no discoloration and no deformation of the edge was observed.</p> <p><Painted metal pipe> When the applied labels were exposed to the extremely high temperature and low temperature, no discoloration and no deformation of the edge was observed. When the applied labels were exposed to the extremely high temperature (over 100 deg. Celsius), after the removal of the label, there were a certain residue of the adhesive remained on the applied surface.</p> <p>*According to the characteristics of the face and the adhesive, we could assume that these vinyl's adhesive force is sufficient between temperatures 0 ~ 50 deg. C. However, at the extreme temperature, the following changes might occur due to the aged deterioration.</p> <p>① Shrinking ② Adhesive and plasticizer melts out</p>

	③ The residue of the adhesive remains on the applied surface, after being peeled off.					
Summary data	Exposed temp.	-20 deg.C	0 deg. C	50 deg. C	100 deg. C	150 deg. C
	Duration	2 hours	10 days	10 days	10days	2 hours
	Stainless steel	○	○	○	○*1	○*1
	Sheet glass	○	○	○	○	○
	Painted metal pipe	○	○	○	○*1	○*1
*1: Residue remains after being peeled off.						
*○=No change						

D. Adhesion under high humidity

Testing method	After affixing the 25 mm width label to a glass plate at room temperature, the label is left under each high humidity environment for the specified time, and then the label condition is observed.										
Judgment	In all cases, no changes were apparent in either the adhesion characteristics or material quality.										
Data	<table border="1"> <tr> <td>Exposure conditions</td> <td>30°C x distilled water</td> <td>30°C x 5% salt water</td> </tr> <tr> <td>Duration</td> <td>24 hours</td> <td>24 hours</td> </tr> <tr> <td>Label condition</td> <td>○</td> <td>○</td> </tr> </table>		Exposure conditions	30°C x distilled water	30°C x 5% salt water	Duration	24 hours	24 hours	Label condition	○	○
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Label condition	○	○									

E. Adhesion depending on the material and surface conditions of the adherend

Testing method	After affixing the 25 mm width label to various types of plastic plates under room temperatures, the plates are left for a long period at room temperatures, and then the label conditions are observed.																										
Judgment	Labels are not peeled off at all even for polyethylene (PE) (olefin series material) adherend materials from which adhesive labels generally peel off easily. With regard to the polyvinyl chloride (PVC) plate, which has Note 3 attached, the results found the residue of adhesive when the label was peeled off. There will be an influence on the adhesive performance according to the adherend materials, surface conditions, presence of grease or dust (soiling), irregularities, curved surfaces, or environmental conditions. Before using the product, be sure to confirm the performance in an inconspicuous location first.																										
Data	<table border="1"> <tr> <td>Adherend</td> <td>PE Polyethylene</td> <td>POM Polyacetal</td> <td>PC Polycarbonate</td> <td>PET Polyethylene terephthalate</td> <td>PVC Polyvinyl chloride</td> <td>PMMA Acryl</td> </tr> <tr> <td>Exposure time</td> <td>1 week</td> <td>1 week</td> <td>1 week</td> <td>1 week</td> <td>1 week</td> <td>1 week</td> </tr> <tr> <td>Label condition</td> <td>○</td> <td>○</td> <td>○</td> <td>○</td> <td>○ Note 3</td> <td>○</td> </tr> </table> <p>Note 3: In some cases, traces of adhesive may be left when the label is peeled from the adherend.</p>						Adherend	PE Polyethylene	POM Polyacetal	PC Polycarbonate	PET Polyethylene terephthalate	PVC Polyvinyl chloride	PMMA Acryl	Exposure time	1 week	Label condition	○	○	○	○	○ Note 3	○					
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F. Chemical resistance and solvent resistance

Testing method	After affixing the label to glass plates, the plates are immersed in various types of chemicals and solvents for 2 hours under room temperatures, and then the label conditions are observed.																																	
Judgment	<p>The results showed that the label is peeled off partly from the adherend after immersion in ethanol, and the label peeled off completely from the adherend after immersion in toluene, ethyl acetate, acetone, and MEK.</p> <p>Other than for the substances described above there was no label peeling or lifting of the edges after immersion in the chemicals and solvents included in the following table.</p> <ul style="list-style-type: none"> - With regard to solvents, there will be a possibility that the adhesive will swell up and the adhesive performance will be reduced in cases where the label is immersed or even if it is only temporarily contacted. It is not recommended to use the labels in environments where solvents are present. - Also with regard to chemicals, there will be an influence on the labels depending on the concentrations. It is also not recommended to use the products in environments where chemicals are present. 																																	
Data	<table border="1" data-bbox="296 958 1399 1397"> <thead> <tr> <th data-bbox="296 958 464 1059">Chemical or solvent</th> <th data-bbox="464 958 632 1059">Toluene</th> <th data-bbox="632 958 783 1059">Hexane</th> <th data-bbox="783 958 951 1059">Ethanol</th> <th data-bbox="951 958 1118 1059">Ethyl acetate</th> <th colspan="2" data-bbox="1118 958 1399 1059">Acetone</th> </tr> </thead> <tbody> <tr> <td data-bbox="296 1059 464 1160">Immersion (2 hours)</td> <td data-bbox="464 1059 632 1160">×</td> <td data-bbox="632 1059 783 1160">○</td> <td data-bbox="783 1059 951 1160">△</td> <td data-bbox="951 1059 1118 1160">×</td> <td colspan="2" data-bbox="1118 1059 1399 1160">×</td> </tr> <tr> <th data-bbox="296 1160 464 1301">Chemical or solvent</th> <td data-bbox="464 1160 632 1301">IPA</td> <td data-bbox="632 1160 783 1301">MEK</td> <td data-bbox="783 1160 951 1301">Distilled water</td> <td data-bbox="951 1160 1118 1301">0.1N hydrochloric acid (HCl)</td> <td colspan="2" data-bbox="1118 1160 1399 1301">0.1N sodium hydroxide (NaOH)</td> </tr> <tr> <td data-bbox="296 1301 464 1397">Immersion (2 hours)</td> <td data-bbox="464 1301 632 1397">○</td> <td data-bbox="632 1301 783 1397">×</td> <td data-bbox="783 1301 951 1397">○</td> <td data-bbox="951 1301 1118 1397">○</td> <td colspan="2" data-bbox="1118 1301 1399 1397">○</td> </tr> </tbody> </table> <p data-bbox="296 1406 1399 1442">*○: Indicates that there was no label peeling or lifting of the edges</p> <p data-bbox="296 1451 1399 1532">*△: Indicates that lifting of the label from the adherend occurred after immersion in the various chemicals or solvents.</p> <p data-bbox="296 1541 1399 1621">*×: Indicates that peeling of the label from the adherend occurred after immersion in the various chemicals or solvents.</p>						Chemical or solvent	Toluene	Hexane	Ethanol	Ethyl acetate	Acetone		Immersion (2 hours)	×	○	△	×	×		Chemical or solvent	IPA	MEK	Distilled water	0.1N hydrochloric acid (HCl)	0.1N sodium hydroxide (NaOH)		Immersion (2 hours)	○	×	○	○	○	
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G. Weathering durability (fading) – Accelerated weather tester –

Testing method
The label is affixed to stainless steel plate, and accelerated weather testing is carried out using a weather meter to simulate being left outdoors. Then the color change condition of the label base material is measured with using a color difference meter.

Judgment
For each label, after undergoing a 600-hour period in the weather meter tester, the results showed that the color difference (ΔE) was 10 or less, meaning that almost no color fading was apparent. Although the yellow label showed a result in which the color difference change was larger than for the other labels, the fading change was of a degree that was not immediately apparent even when compared against the original color.

Data

Testing instrument	Weather meter				
Light source	Xenon arc lamp				
Duration	50 hours	100 hours	200 hours	400 hours	600 hours
White	0.19	0.16	0.15	0.17	0.27
Red	0.61	0.84	0.81	1.22	1.81
Blue	0.24	0.24	0.34	0.30	0.37
Yellow	0.93	1.75	3.14	5.33	7.45
Green	0.17	0.25	0.54	1.10	1.62

The graph plots the color difference $[\Delta E]$ on the y-axis (ranging from 0 to 20) against the duration in hours on the x-axis (50, 100, 200, 400, 600). A dashed horizontal line is drawn at $\Delta E = 10$. The data points for each color are as follows:

Color	50 hours	100 hours	200 hours	400 hours	600 hours
White	0.19	0.16	0.15	0.17	0.27
Blue	0.24	0.24	0.34	0.30	0.37
Green	0.17	0.25	0.54	1.10	1.62
Red	0.61	0.84	0.81	1.22	1.81
Yellow	0.93	1.75	3.14	5.33	7.45

* The figures indicate the color difference (ΔE).
 * Larger ΔE figures represent greater differences in color from the original color. Providing that ΔE is 6 or less, the degree of color fading will be almost unnoticeable. If ΔE becomes 10 or larger, it means that the degree of color fading will be immediately apparent when compared to the original color.
 * The above description only indicates the results of the accelerated weather testing. The description below is given as a rough guide.
 • Weather meter 200 hours: Corresponds to the exposure to a one-year amount of sunlight outdoors
 * The above description gives the results of the accelerated weather testing. There will be situations where this will differ from the result of actually exposing the labels outdoors.

- ☆ The details of the above description are based on actual measurements, and are not guaranteed values.
- ☆ Regarding the performance after affixing the label, it will be a precondition that the label has been affixed properly.
- ☆ The final judgment of whether or not to use the label should be made by the customer.

Precautions when using Bepop vinyl

[Precautions for the affixing work]

1. Before affixing the label, carefully wipe off any soiling, grease, or moisture from the adherend surface.
2. Note that it will be hard to affix the label when the adherend surface is not smooth.
3. When affixing labels, carefully affix the label in a way that will avoid introducing bubbles, and apply adequate pressure using a squeegee.
4. When storing labels, place them inside the packaging plastic bag to prevent dust attachment, and store them in a cool and dark location avoiding direct sunlight.
5. When printing vinyl in the Bepop machines, blank printing areas may occur in the case where there is dust, soiling, or grease attached to the vinyl surface. Take care to avoid excessively touching the vinyl surface before carrying out printing.
6. There will be an influence on the adhesive performance according to the adherend materials, surface conditions, presence of grease or dust (soiling), irregularities, curved surfaces, or environmental conditions. Before using the product, be sure to check the performance in an inconspicuous location first.

* Adherends that are inappropriate for application

Not enough adhesive performance	Polyethylene, polypropylene, silicone coatings, fluorine coatings, etc.
Not enough adhesive performance, due to rough surface	Hairline-finished metal plate, foamed materials, plywood, concrete, mortar, slate, cloth, frosted glass surfaces, etc.

[Temperature for affixing work]

The suitable temperature for carrying out the label affixing work is between 15 and 25°C.

It is strongly recommended that the label affixing work should be carried out in this temperature range.

Winter period	Particularly when using the labels at temperatures of 10°C or lower, the labels will become stiff and the adhesive strength will be reduced. In this case, preheat the label to a suitable temperature using a dryer or similar device and then apply with adequate pressure. Further, avoid the application of labels with spraying water to the adherend, at temperatures of 10°C or lower.
Summer period	When the temperature is high, the adhesive strength will increase, which may make the application work difficult in some situations. Carry out the work in a location that has air conditioning, or in a shady place.

[Safety precautions]

1. Silicone processing is applied to the surface of the release paper for the best performance. Because the silicone surface is generally slippery, take adequate care to prevent accidents caused by products falling over or undergoing load shifting.
2. If labels are affixed directly to the human body, skin rashes may be caused, so avoid affixing labels directly to the body.
3. Do not affix labels to clothing, since there is a risk that the clothing will change color.

