

# Nikkalite®

Retroreflective Products

PB NO.4400

## Nikkalite® 4400 ECONOMY GRADE (MG) RETROREFLECTIVE SHEETING



## 1. INTRODUCTION

Nikkalite® 4400 Series Economy Grade (MG) retroreflective sheeting is a relatively inexpensive material that can be used for the manufacture of temporary road signs, multi-color graphics, advertising boards and similar products

where a short to medium term durability is required.

These materials are **not recommended** for the manufacture of **permanent Road Traffic Signs**. They have useful working life of at least 3 years.

## 2. DESCRIPTION

Nikkalite® 4400 series MG material offers a lowtack pressure sensitive adhesive, for application onto clean and smooth surfaces of tested and approved metal, coated metal and plastic sheets.

where the sign face material and substrate have been allowed to condition. Curing times will be influenced by surrounding temperature, approximately 48 hours at 20°C (68°F). **DO NOT ALLOW THE ADHESIVE TO FREEZE DURING CURING PERIOD.** 4400 series have an easily

Application should be undertaken in an area having an ambient temperature of between 18°C to 25°C (64°F to 77°F),

removable paper liner protecting the adhesive.

Nikkalite® Economy Grade retroreflective sheeting offers the following characteristics:

- Color fast
- Resistance to corrosion
- Resistance to most solvents
- Resistance to weather
- Excellent adhesion
- Dimensional stability

### Roll sizes and color availability:

Item No.	Color	Standard Roll Width			Standard Roll Length 45.7m (50 Yards)
		610mm(24")	920mm(36")	1220mm(48")	
4412	White	YES	YES	YES	YES
4404	Yellow	YES	YES	YES	YES
4405	Red	YES	YES	YES	YES
4406	Blue	YES	YES	YES	YES
4407	Orange	YES	YES	YES	YES
4408	Green	YES	YES	YES	YES

Please check color / width / length availability with our sales office listed on the last page.

### 3. TECHNICAL DATA

#### a) Physical Properties of Nikkalite® 4400 Series MG Retroreflective Sheeting

Property	Test Method	Results
Average Thickness	Micrometer	120 $\mu$
Gloss	Glossmeter	More than 60
Tensile Strength	T-Strography at 23°C	3.2Kgf / 25mm
Elongation	T-Strography at 23°C	30%
Adhesion	90° peel test at 23°C	Less than 4mm

#### b) Resistance to:

Chemical Agent	Exposure Time	Results
Water	1 month at 23°C	No effect
Lube Oil	24 hours at 23°C	No effect
Gasoline	30 min. at 23°C	No effect
Mineral Spirit	10 min. at 23°C	No effect
Toluene	1 min. at 23°C	No effect

### 4. RETROREFLECTIVITY

Typical coefficient of retroreflection for 4400 series MG is shown in the table below.

(cd/lux/m<sup>2</sup>)

O.A.	E.A.	4412	4404	4405	4406	4407	4408
		White	Yellow	Red	Blue	Orange	Green
0.2 (12')	-4/5	42.0	39.0	17.0	3.5	31.0	12.0
	15	36.0	36.0	15.5	2.3	28.0	11.0
	30	27.0	25.0	10.5	2.0	21.0	7.7
	40	17.0	16.0	6.0	1.4	12.0	5.2
0.33 (20')	-4/5	33.0	33.0	14.5	2.7	27.0	9.7
	15	29.0	30.0	12.5	2.0	23.0	8.6
	30	23.0	22.0	9.6	1.6	18.0	6.6
	40	15.0	15.0	5.5	0.9	10.0	4.4
0.5	-4/5	22.0	25.0	10.0	1.9	21.0	6.6
	30	17.0	18.0	7.5	1.0	16.0	4.9
1.0	-4/5	9.7	8.0	4.4	0.7	6.9	3.2
	15	9.6	7.8	4.2	0.6	6.5	3.1
	40	7.5	6.0	2.7	0.4	4.0	2.0
2.0	-4/5	5.3	4.4	2.3	0.4	3.8	1.6
	30	5.2	4.3	2.1	0.4	3.1	1.4
	40	4.0	3.5	1.5	0.3	2.6	1.1

O.A. : Observation Angle, E.A. : Entrance Angle

## 5. SILK SCREEN PRINTING

Nikkalite® N3800 two pack inks are extremely durable, highly transparent, quick drying and fast curing inks, that bond strongly and permanently to Nikkalite® retroreflective sheeting. Normally, Nikkalite® ink does not require dilution with thinner due to its pre-adjusted viscosity. However, when it is necessary, use only Dihydroturpenyl acetate.

Use N3800 twopack ink (ink and hardener) for situations that require a very hard “**Vandal-resistant**” finish. This ink is highly scratch resistant and also offers good resistance against most solvents, gasoline, grease and oil's etc.

Clear coating or edge sealing is not normally required for either ink, however, if it is specified use the appropriate N3812 clear toner to the relevant series ink being used.

For screen printing Road Traffic Signs a 62T-77T/cm (157-180/in.) polyester mono-filament plain weave mesh is recommended to achieve the correct depth of color and the durability required. Do not print Nikkalite® N3800 series ink onto other series inks or vice versa. When screen printing with other manufacturer's ink, thinner, etc. onto Nikkalite® sheeting, the user must accept all responsibility.

### Inks available:

Nikkalite® Brand Process Colors are available for screen processing on UL:N3800 Series in the colors listed

below. All colors except Black are transparent.

**Table 5**

COLOR	N3500 Series
Black(Opaque)	N3803
Yellow	N3804
Traffic Sign Red	N3825
Blue	N3806
Orange	N3807
Green	N3808
Brown	N3809
Toner	N3812
Hardener	N3830
Thinner	Dihydroturpenyl acetate

N3800 Series Process color may be;

- either PRE-SCREENED or POST-SCREENED
- either with N3830 Hardener or without Hardener

on MG.

when use N3800 with N3830 Hardener, the following mixture (by weight) must be used.

- ink : 100 parts
- N3830 : 14 parts

## 6. COLOUR MATCHING

When using more than one piece of 4400 Series MG sheeting together, sheeting from the same roll should be used for uniform color matching and reflectivity. Every

other piece of material should be rotated by 180°, so the same roll edges come together. Color matching is the responsibility of the sign manufacturer.

## 7. SUBSTRATE PREPERATION BEFORE APPLICATION

Nikkalite® 4400 Series MG sheeting will bond to clean smooth surface of tested and approved metal, coated metal and plastic sheets. There are many types of plastic sheets available, with new products coming onto the market all the time. Some will emit plasticizer or gas from their surface, which has a detrimental effect on the

adhesion of retroreflective materials. You should pre-check the quality and suitability of them before use. To obtain optimum adhesion and good durability it is necessary to eliminate such problems. This can be done by abrading the surface, by cleaning with solvents or by chemical treatment.

### a) For correct application the substrate surface should be:

- |                         |                                                     |
|-------------------------|-----------------------------------------------------|
| ☆ Clean and smooth      | ☆ Rigid and weather resistant                       |
| ☆ Relatively non-porous | ☆ And not emit any release agents from it's surface |

Suitable smooth clean surfaces, pre-treated to prevent corrosion and allowed to condition for approximately 24 hours at an ambient temperature between 18°C to 25°C

(64°F to 77°F), in an area protected from moisture, will provide a durable bond.

### b) Treatment Methods:

#### “A” Cleaning with solvent

- (1) Prepare clean, soft cloth (as clean as possible).
- (2) **1<sup>st</sup> Step:** Soak the cloth with any of the solvent described below and wipe the surface completely.
- (3) **2<sup>nd</sup> Step:** Soak another piece of cloth with the solvent and wipe the surface once again.
- (4) **3<sup>rd</sup> Step:** Wipe the surface again with a dry clean cloth.
- (5) You can use the cloth from step 3 again for the 2<sup>nd</sup> or 1<sup>st</sup> step but contaminated cloths should always be

discarded, as dirty cloths will spread contamination all over the surface.

(6) Confirm that there are no residues of dirt or solvent on the surface.

(7) Suitable solvents: Mineral Sprit, Toluene, Xylene

(8) For plastic panels please refer to “B” below and use the minimum amount of solvent for soaking the cloth and wipe the surface swiftly.

**“B” Abrasion Method**

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- (1) Rub the surface of the aluminum plate evenly with sandpaper, No.150-200, or impregnated nylon scouring pads. For plastic surface or painted steel, use No.400 or fine sandpaper.
- (2) Ideally the debris should be taken away with a vacuum cleaner.
- (3) Wipe the surface as instructed in “A” 2-8 above.

- (4) The abrasion method will remove the oxidized surface film or contamination and will leave the surface clean. The abraded roughened surface will also aid adhesion. However, too much abrasion will result in poor adhesion.
- (5) The abrasion work should be carried out away from the application and printing areas.

**“C” Chemical Method**

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- (1) Many kinds of treatment agents are available such as sodium dichromate, phosphoric acid, etc. It is important to follow the manufacturers' instructions as to dilution ratio, treatment temperature, treatment time, etc.
- (2) Care should be taken of the substrate after chemical treatment. Thorough washing should be undertaken with water to eliminate excessive agent from the surface,

which will reduce the retroreflective sheeting life.

- (3) Before sending the treated substrates to the application areas the surface should be dried thoroughly.
- (4) Some treatment agents have a limited effective life when used on the substrates. Therefore, treated substrates should be applied as quickly as possible.

**c) Substrate Material and Treatment Methods:**

Substrate	Treatment Method	Remarks
Aluminum	<b>A</b>	Aluminum pre-treated by manufacturer
Aluminum	<b>B+C</b>	Not treated
Iron & Steel	<b>B+C</b>	Epoxy powder or melamine thermosetting painted sheet is recommended
Stainless Steel		Do not recommend
Galvanized Iron	<b>C</b>	Adhesion is normally poor
Painted Iron	<b>B</b>	Epoxy powder or melamine thermosetting painted sheet is recommended
Glass plate	<b>A</b>	MEK(Methyl-Ethyl-Ketone) or acetone
Concrete		Pre-treat surface with a suitable primer for concrete and dry thoroughly
<b>Plastics:</b> Polycarbonate, PVC Polymethyl Metacrylate Epoxy, Polyester Melamine, Polyethylene Polypropylene	<b>A</b>   <b>A</b>	1) Wipe with methanol 2) Wipe with methanol, allow to stand, remove the debris and wipe again with methanol  1) Wipe with methanol 2) Wipe with methanol, allow to stand, remove the debris and wipe again with methanol

**NOTE : PLASTICS**

- When cleaning plastic surfaces with solvent, soak the cloth with a small amount of the solvent and wipe the surface quickly. If solvent remains on the surface, wipe it off with a clean dry cloth.
- Some plastics will develop hairline cracks on the surface after wiping with solvent. Perform a test by trying the solvent on a small panel before full treatment.
- Those plastics which do develop hairline cracks should be wiped with a cloth with mild detergent solution and then washed thoroughly with water and dried.

## 8. APPLICATION

Nikkalite® 4400 Series Economy Grade retroreflective sheeting is coated with pressure sensitive (PS) adhesive that, when applied at room temperature of 18°C to 25°C (64°F to 77°F) is easy to handle and apply. MG is bonded to the sign substrate by application of pressure with a hand roller, a manual roller applicator or power squeegee roller applicator.

Aluminum plate, epoxy powder or backed melamine painted panels normally provide good adhesion properties for retroreflective sheeting. The sheeting does not adhere well to some types of air drying paints, therefore, before

applying to painted surfaces care should be taken to test the surface.

Plastics that are being used for the first time should be tested to determine whether the sheeting will perform well by exposing a test specimen at 70°C (158°F) for three hours to check bubbles causing out-gassing from plastic and by exposing a test specimen outdoors facing south at 45 degrees (in the southern hemisphere, north facing 45 degrees) for at least three months to check adhesion strength to the substrate.

## 9. GRAPHIC CUTTING

Friction or sprocket driven rotary plotters, flat bed plotters or craft type cutting knives are all suitable for cutting 4400 Series MG materials.

The material must be allowed to condition, out of its box and correctly supported, ideally in a room with an ambient

temperature of 18°C to 25°C (64°F to 77°F). If the entire area cannot be heated to 18°C (64°F) or above, use some form of safe heating to provide warm air onto the working area.

## 10. STORAGE

Retroreflective sheeting should be stored between 15°C to 25°C (59°F to 77°F), ideally with a relative humidity of 30% to 60%, and out of direct sunlight. Store full and open rolls horizontally, above the floor, in the carton as they were supplied and suspended on the plastic supports, or suspended through the core with a suitable bar. Do not

leave full or open rolls of material resting on hard surface; this may cause bruising to 18°C to 25°C (64°F to 77°F) reflective material, which may not be seen until exposed to a light source. Do not stand full or part rolls vertically on their end. Retroreflective sheeting should be used within one year after purchased.



## 11. CLEANING / MAINTENANCE

During its lifetime the sign may require cleaning at some stage. The sign will probably have sand / grit within the surface dirt, therefore it is recommended that a low-pressure flow of water is used to help remove this loose dirt and sand / grit from the sign first. Never use a strong jet of water. Rubbing the sand/grit into the sign during the cleaning procedure may cause irreparable damage to the sign material. Therefore, care must be taken during the cleaning process. A small solution of a mild detergent in

clean warm water is recommended for cleaning the material surface. The detergent and cloth must be non-abrasive, free of any strong aromatic solvents or alcohols and be chemically neutral. Rinse the whole area thoroughly after washing and allow to dry naturally or use a lint free cloth. Tar or similar deposits can be removed by a light application of turpentine, following with the washing instructions above.

## 12. DURABILITY

When processed and applied in line with the manufacturers instructions, Nikkalite® 4400 Series MG material when exposed vertically under normal weathering conditions

can be expected to have a useful life of at least 3 years. However, actual performance depends greatly on type and treatment of substrate and on weathering conditions.

### Reliability of Information

All recommendations and technical information contained herein are based on experiences and tests, which the manufacturer believes to be reliable; however, their accuracy and completeness are not warranted.

The user is requested to conduct their own test/tests to determine the fitness of this product for the intended application.

### Warranty

**Nikkalite®** Products are warranted to be free from defects in materials and workmanship at the time of their sale, except herein expressly warranted. NCI's (Nippon Carbide Industries Co., Inc.) liability is limited to replace the defective materials solely as

stated herein. NCI shall not be liable for any loss, damage or injury, direct or indirect or incidental, arising from the use or inability to use said products, and the warranties of merchantability or fitness for a particular purpose as well.

### Warning

Failure to comply with the explicit instructions in this bulletin will result in voiding all warranties express or implied for use of this product. If retroreflective sheeting is to be applied to a surface other than conventional

sign blank materials, prospective users should contact technical representatives of Nippon Carbide Industries Co., Inc. for advice before such application.

### Safety and Health Information

Read carefully in advance the labels, instruction manuals, material safety data sheets (MSDS), and first aid measures of the retroreflective sheetings supplied by Nippon Carbide Industries Co., Inc. (hereinafter referred

to as "NCI"), the auxiliary materials such as inks and solvents used for NCI's products, and proprietarily used chemicals such as substrate cleansers.



# NIPPON CARBIDE INDUSTRIES CO.,INC.

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## ■Japan(Head Office)

Nippon Carbide Industries Co., Inc. : 11-19, 2-chome Konan, Minato-ku, Tokyo  
108-8466, Japan

Telephone : 81-3-5462-8206   Telefax : 81-3-5462-8271

## ■U.S.A.

Nippon Carbide Industries (USA) Inc. : 3136 East Victoria St., Rancho  
Dominguez, CA. 90221, U.S.A.

Telephone : 310-632-7500   Telefax : 310-632-1959

## ■Germany

Nippon Carbide Industries (Europe) GmbH : Halskestraße 27, D-47877, Willich,  
F.R.Germany

Telephone : 49-(0)21 54 42 86 05   Telefax : 49-(0)21 54 42 86 80

## ■France

Nippon Carbide Industries France S.A. : 5 bis, rue du Petit Robinson 78353  
Jouy-en-Josas Cedex France

Telephone : 33(0)1 34 65 00 00   Telefax : 33(0)1 30 70 64 55

## ■Spain

Nippon Carbide Industries España S.A. : Rocafort, 250, bajos, 08029 Barcelona,  
Spain

Telephone : 34-93-419.79.90   Telefax : 34-93-410.01.61

## ■Netherlands

Nippon Carbide Industries (Netherlands) B.V. : Eisterweg 5, 6422 PN Heerlen, The  
Netherlands

Telephone : 31-(0)45-542 95 00   Telefax : 31-(0)45-542 96 39

## ■China

Nippon Carbide Industries (Hangzhou) Co., Ltd. :

No.99 Hongda Road Qiaonan-Qu, Xiaoshan Economic & Technology Development  
Zone, Hangzhou, Zhejiang, China

Telephone : 86-(0)571-82696666   Telefax : 86-(0)571-82696473