



# Class 1/Class 400 Reflective Tape

## HIP-4000/4100 High Intensity Prismatic Grade

TAPES INTERNATIONAL

ADHESIVE TAPE SPECIALISTS

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Supersedes all previous versions

### Product Description

REFLOMAX GLODIAN™ HIP-4000/4100 series is highly reflective, waterproof, self-adhesive films with excellent corrosion and solvent resistance. The product was specifically developed for the manufacture of traffic signs, which are intended for long term vertical outdoor use. REFLOMAX GLODIAN™ HIP-4000/4100 series is composed of a UV stabilized acrylic front film. It's retroreflective system consists of sealed cells of air backed microprisms, using total internal reflection. The distinct pattern and sealing identifies the machine direction and the manufacturer of the sheeting shown in Figure 1.

The sheeting displays a watermark (general colours only) with the product code and service time in a repeat pattern to provide identification to users and visual verification of proper use by inspectors, shown in Figure 2. The product complies with the requirements of ASTM D 4956 Type 4, KS T 3507 Type 4, AS/NZS 1906.1:2017 Class 400, EN12899-1 Class RA2, GB/T 18833 Class 4, GOST 32945 Class 2, JIS Z 9117 Type 2-A-a & 2-A-b concerning micro-prismatic materials. Class 400 Permanent Road Signage *interim approved* pending outdoor weather exposure testing.



### Retroreflectivity

REFLOMAX GLODIAN™ HIP-4000/4100 series exceeds the minimum performance requirements of ASYM D4956 Type IV. The required minimum retroreflection values, shown in table 1, are complied with when measured in accordance with the corresponding specifications using CIE54:1982.

### Colour

REFLOMAX GLODIAN™ HIP-4000/4100 series is available in white (01), yellow (03), orange (05), red (07), green (09), blue (11) and brown (15), as well as fluorescent yellow-green (02) and fluorescent orange (04). The sheeting conforms to the daytime colour requirements in table 2 and nighttime colour requirements in table 3 and shall comply with the specifications of ASTM D4956.

Figure 1 - Sealing pattern and application directions

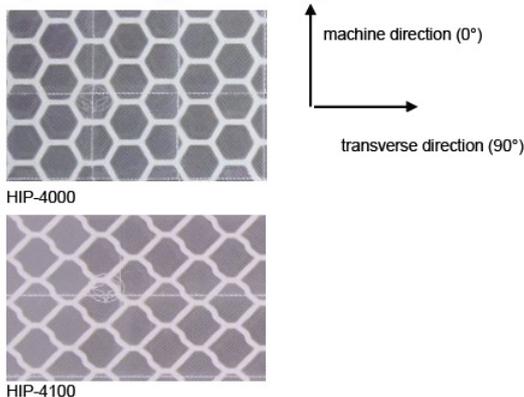
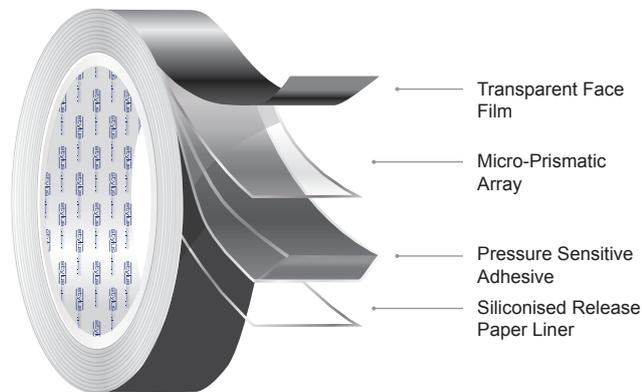


Figure 2 - Watermark



The above information is given in good faith for guidance only and not specification purposes. All data is based upon average values, the Purchaser shall be responsible for determining the suitability of this product for their purposes.



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## Adhesive

REFLOXMAX GLODIAN™ HIP-4000/4100 series has a pressure-sensitive adhesive that is recommended for room temperature application. Room temperature application is defined as 18°C-25°C (64°F-77°F)

## Application/Processing

REFLOMAX GLODIAN™ HIP-4000/4100 series was especially developed for traffic sign applications. Substrate to which the material will be applied must be thoroughly cleaned. The substrate must be free of dust, oil, fats, silicon or other contamination. REFLOMAX GLODIAN™ HIP-4000/4100 series is optimized for application onto flat substrates or aluminium alloys or galvanized steel. For other applications, the user is fully responsible for evaluating the suitability of the product and for any risks associated with that use.

Note: All REFLOMAX GLODIAN™ products are manufactured within an ISO 9001:2015 controlled environment.

## Product Data

### Retroreflectivity for new sheeting (cf/lx/m<sup>2</sup>) as per ASTM D4956

Observation angle	0.1°		0.2°		0.5°	
	-4°	30°	-4°	30°	-4°	30°
white	500	240	360	170	150	72
yellow	380	175	270	135	110	54
orange	200	94	145	68	60	28
red	90	42	65	30	27	13
green	70	32	50	25	21	10
blue	42	20	30	14	13	6
brown	25	12	18	8.5	7.5	3.5
fl. yellow-green	400	185	290	135	120	55
fl. orange	150	70	105	50	45	22

### Daytime colour specification limits

Colors	1		2		3		4		Luminance Factor (Y %)
	x	y	x	y	x	y	x	y	
white	0.303	0.300	0.368	0.366	0.340	0.393	0.274	0.329	> 27
yellow	0.498	0.412	0.557	0.442	0.479	0.520	0.438	0.472	15 ≤ Y ≤ 45
orange	0.558	0.352	0.636	0.364	0.570	0.429	0.506	0.404	10 ≤ Y ≤ 30
red	0.648	0.351	0.735	0.265	0.629	0.281	0.565	0.346	2.5 ≤ Y ≤ 15
green	0.026	0.399	0.166	0.364	0.286	0.446	0.207	0.771	3 ≤ Y ≤ 12
blue	0.140	0.035	0.244	0.210	0.190	0.255	0.065	0.216	1 ≤ Y ≤ 10
brown	0.430	0.340	0.610	0.390	0.550	0.450	0.430	0.390	1 ≤ Y ≤ 9
fl. yellow-green	0.387	0.610	0.369	0.546	0.428	0.496	0.460	0.540	≥ 60
fl. orange	0.583	0.416	0.535	0.400	0.595	0.351	0.645	0.355	≥ 20



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## Nighttime colour specification limits

Colors	1		2		3		4	
	x	y	x	y	x	y	x	y
white	0.475	0.452	0.360	0.415	0.392	0.370	0.515	0.409
yellow	0.513	0.487	0.500	0.470	0.545	0.425	0.572	0.425
orange	0.595	0.405	0.565	0.405	0.613	0.355	0.643	0.355
red	0.650	0.348	0.620	0.348	0.712	0.255	0.735	0.265
green	0.007	0.570	0.200	0.500	0.322	0.590	0.193	0.782
blue	0.033	0.370	0.180	0.370	0.230	0.240	0.091	0.133
brown	0.595	0.405	0.540	0.405	0.570	0.365	0.643	0.355
fl. yellow-green	0.480	0.520	0.473	0.490	0.523	0.440	0.550	0.449
fl. orange	0.625	0.375	0.589	0.376	0.636	0.330	0.669	0.331

## Application Instructions

### Processing Instructions

This application instruction is to explain proper ways to apply REFLOMAX GLODIAN™ HIP-4000/4100 series to traffic signs. Even though it is impossible to explain all aspects that need to be taken into account, this application instruction comprises a large number of useful tips for handling REFLOMAX GLODIAN™ HIP-4000/4100 series.

The sign producers who will use RELOMAX GLODIAN™ HIP-4000/4100 series should follow this application instruction to produce their signs in the right way for traffic signs according to the following standards: ASTM D 4956 Type 4, KS T 3507 Type 4, AS/NZS 1906.1:2017 Class 400, EN12899-1 Class RA2, GB/T 18833 Class 4, GOST 32945 Class 2, JIS Z 9117 Type 2-A-a & 2-A-b.

Also specific knowledge and skills of sign producers are prerequisites for the processing of REFLOMAX GLODIAN™ HIP-4000/4100 series.

### Storage and Transportation

- REFLOMAX GLODIAN™ HIP-4000/4100 series is supplied in cartons specially made in consideration of roll sizes. The roll should be stored in the original carton with standard spacers provided. The spacers minimize formation of pressure marks and surface damage which can be caused by impact from outside. Please make sure that partly processed rolls should also be stored in the same condition as suggested above.
- REFLOMAX GLODIAN™ HIP-4000/4100 series should be stored in a cool, dry indoor area that is protected from direct sunlight. Recommended temperatures for storage are from 18°C-24°C (65°F-75°F) and relative air humidity from 46% to 60%.
- It is advisable to stay rolls in horizontal condition. If the rolls are stored in a vertical, a negative influence on the film's characteristics is expected.

## Size & Packing

- Roll Size: 123cm x 45.7m (48.4in x 50yds)  
 Gross: 29 kgs (63.9lb)  
 Weight: 31 kgs (68.3lb)  
 Packing: 40 rolls per pallet/320 rolls per 20' container



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## Printing

1. REFLOMAX GLODIAN™ HIP-4000/4100 series can be screen-printed with screen printing ink for traffic sign or digitally printed with UV digital ink.
2. There could be quality deviation by printing method, ink print machine, printing process, donction and technical skill of user etc., therefore, pretesting before printing is necessary.
3. It is recommended to use REFLOMAX GLODIAN™ EC-1001 on the surface of printed film in order to improve durability of ink.

### 1. Screen printing advance preparations

1. It is recommended to use screen printing ink for traffic sign that is a solvent based, two liquid base (ink + hardener), and quick drying colour system.
2. Printing should be done in compliance with guideline from ink supplier.
3. The screen-printing table must be flat and mechanically stable. Vacuum conveying is required for printing film sheets.
4. As the hardness or elasticity of squeegees has a decisive influence on the printing result, squeegee rubbers with Shore hardness of 65-75A are recommended.
5. The squeegees and screen must be washed with proper solvent before starting screen-printing.
6. Also, surface of film should be cleaned by anti-dust or anti-static fabric to make sure there isn't any substance on surface prior to printing.

### 2. Screen printing

1. Optimum conditions for the printing process require an air temperature ranging 20°C(68°F) to 24°C(75°F) and relative air humidity from 20% to 50%. Unfavourable ambient conditions may require the use of thinning or retarding agents to adjust the ink for processing. However, it might cause the ink to not meet required specification values for colour and retroreflection if the thinning or retarding agent if used too much.
2. The distance between the screen and the film surface should be set suitably according to testing result. If the distance is too short, it could lead to poor print quality results.
3. It is recommended to maintain a medium squeegee speed of approximately 0.75m/s and the squeegee should be applied at an angle of 30° to the print surface. Squeegee speed could cause poor print quality when it's too quick or too slow.
4. As excessive squeegee pressure can result in smearing or burred contours and edges, proper testing and user's skill are necessary.

### 3. Drying after screen printing

1. The sheet must be flat when drying.
2. The drying time of the prints depends on the type of sheet or ink used, ambient temperature and specific local conditions etc.
3. Forced drying is recommended by means of drying in a convection oven to facilitate quick and economical processing of the sheets after printing. In case of using this forced drying, the film should be used after 48 hours from drying, maximum after a week.
4. Please note that the maximum number of sheets stacked should not exceed 40 sheets. If excessive number of sheets are stacked, it could result in poor quality on printed surface by high pressure.
5. Prints on pre-laminated traffic sign substrates should be stored vertically and each sign substrate should maintain proper distance to avoid making bad influence in quality of printed surface.

### 4. UV digital printing

1. The printing process requires an air and material temperature between 20°C(68°F) and 26°C(78°F) and relative air humidity between 40% and 60%. It is optimum condition to make the room free from dust.
2. It is required to wear cotton gloves to prevent contamination of the surface during printing process.
3. It is necessary to set up optimum condition after enough testing prior to print and skill of an expert is required to acquire good quality of printing as there could be quality deviation by printing equipment.



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## Cutting, Plotting

1. REFLOMAX GLODIAN™ HIP-4000/4100 series can be cut by means of commercial cutting plotter, die-cut plotter etc.
2. It is not recommended to cut several sheets at the same time when cutting by die-cut plotter.
3. It is recommended to set up proper pressure and cut proper number of sheets when being cut by stack cutter.
4. It is highly recommended that every cutting process should be carried out with setting up proper process conditions made after enough testing done in advance.

## Adhesive bonding & lamination

1. In order to acquire optimum condition of adhesion with REFLOMAX GLODIAN™ HIP-4000/4100 series, it is important to make the substrate clean.
2. The substrate must be free of dust, oil, fats, silicon or other contamination. If the substrate needs to be treated with a solvent like IPA, the next processing step cannot be carried out until the solvent is completely evaporated.
3. The surface of substrate should be sleek. In case of adhesion on substrate that is not sleek like welded joint part, there could be possibility to make difference in adhesion strength by working condition and ambience.
4. REFLOMAX GLODIAN™ HIP-4000/4100 series is optimized for application onto flat substrates of aluminium alloys or galvanized steel.
5. It is not recommended to carry out lamination at air and material temperatures of less than 15°C(59°F) due to the fact that it can cause problem in adhesion strength. The optimum bonding temperature is 21°C(69°F) and the films should be stored in rooms in which they will be processed with optimum condition for at least 48 hours before lamination.
6. REFLOMAX GLODIAN™ HIP-4000/1000 series has coated pressure sensitive adhesive layer complying with class 1 of Section 4.3 Blacking Classes of ASTM D4956-16b standard. Therefore there is no need to use additional and/or previous heat, solvent agent in order to apply sheeting on the board. It is good enough to use manual pressure only. Please make sure NOT to apply excessive heat while applying reflective sheeting on the board, which possibly may cause serious damage on the basic qualities of sheeting.
7. If you use a film-laminating machine, the coated rubber of upper roller should be with Shore hardness 65-75A and the roll gap should be adjusted over the entire width not to make a deviation.
8. The bonding process should be carried out with proper pressure set up after pre-testing.
9. If it is necessary to apply two pieces of sheeting overlapped, upper sheet should be placed on lower sheet to avoid rainwater getting in between them in case of rain.
10. Please be careful about direction of sheets when bonding process and make sure that it is carried out in one-way direction. There could be deviation in reflective performance if it is adhered crossed at direction of sheets.
11. It is advisable that the sheets used for bonding process are processed under the same light conditions.
12. It is recommended to use only films from the same roll for one substrate in order to have colour-matched. If more than one roll is required, only film from the same production lot should be used.
13. It is recommended that applied substrate should be installed after storing for 72 hours under condition of temperature 20°C(68°F)-26°C(78°F) and relative air humidity 40%-60% in order to have enough adhesion strength on substrate.
14. When using films, it is necessary to take all process and work condition into account which can make impact on adhesion strength of product and bonding processing.

Also, please perform enough test in advance considering whether it's suitable for the application or not and performance of product. When you intend to apply products to application above suggested applications, please have a prior consultation with REFLOMAX fully.



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### Cleaning of applied products

Surfaces should only be cleaned with clear water, water/isopropanol (80/20%) or diluted soap solution. Please do not use any solvents or abrasive cleaning agents like metal or sand for the cleaning of reflective films. This could cause serious damage on surfaces.

### Durability

The durability of REFLOMAX GLODIAN™HIP-4000/4100 series and finished signs using them will depend upon substrate selection and preparation, compliance with recommended application procedures, geographic area, exposure conditions, and maintenance.

Maximum durability of REFLOMAX GLODIAN™HIP-4000/4100 series can be expected in applications subject to vertical exposure in stationary objects when processed and applied to properly prepared aluminium according to Reflomap's recommendations. Periodic sign inspection and regular sign replacement are strongly recommended in order for sign owners to establish their own effective service life expectation beyond any durability warranty, if provided.

### Substrate

The user must determine the suitability of any nonmetallic sign backing for its intended use. Applications to unprimed, excessively rough or non-weather resistant surfaces can shorten the performance of such applications.

### Exposure

Exposure to severe or unusual conditions can shorten the performance of such applications. Signs in mountainous areas that are covered by snow for prolonged periods may also have reduced durability. Atmospheric conditions in certain geographic areas may result in reduced durability.

### Splice

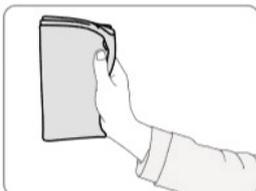
There could be one splice per roll and additional meter will be provided in case of roll with splice.

### Life Durability

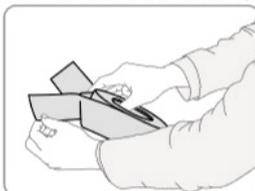
- Solid Plain Colours - 10 years
- Fluorescent Yellow/Green - 7 years
- Fluorescent Orange - 3 years

### How to Install

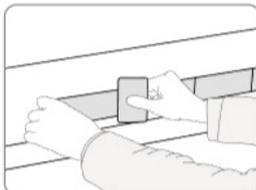
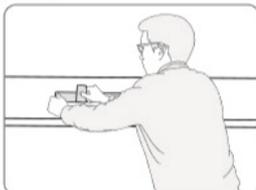
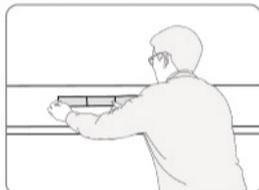
1 Clean the area where the tape is to be attached



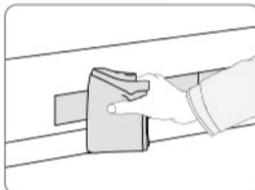
2 Remove the release film and attach tape



3 Use a card or squeegee to attach the entire surface



4 Clean/ wipe the surface





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Colour Swatches

Standard colours available



Blue



Green



Red



White



Yellow



Fluoro Yellow/Green



Black/Yellow



Red/White



Red/Yellow

Colours available by indent only



Brown



Orange



Fluoro Orange

Please note: These colour swatches are for quick reference ONLY. Exact colours may not print or appear correctly on a computer monitor. For exact colours please request a sample from your Stylus Tapes International representative.



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## Recommended Storage Conditions

Product must be kept in its original box and packaging in a dry atmosphere away from direct sunlight. The optimal storage conditions for this product is between 18°C - 22°C with a relative humidity of 40% - 50%.

## Material Safety Data Sheet

MSDS can be downloaded from Stylus Tapes website [www.stylustapes.com.au](http://www.stylustapes.com.au)

## Recommended Cleaning & Installation Procedures

### STEP 1 - SURFACE EVALUATION:

There are numerous types of adhesive tapes, some suited to a variety of uses and others for more specialised individual applications. A thorough evaluation is recommended when bonding to any surface. Porous surfaces such as wood, concrete & brick should be smooth & sealed with an appropriate sealer prior to application. All adhesive tapes should only be applied to clean & dry surfaces. There are various methods of preparation depending on the surface and/or application. For technical advice we recommend you speak with our local sales office. Surfaces must be free of:

- Any Contaminants
- Moisture & Chemical Residue
- Dust, Fibres, Concrete Powders, Sand, Soil & Dirt Particles
- O.E.M. Cleaners, Grease, Wax, Detergent & Release agents on plastic profiles/extrusions etc
- Flaking Paint & Corrosion

### STEP 2 - CLEANING INSTRUCTIONS:

The surface being applied to should be prepared with an appropriate cleaning solution, preferably IPA (Isopropanol) using a clean lint-free wiping cloth or disposable wipe (never re-cycled rags). Renew cleaning cloths regularly. (Applications involving paper, board, fabric etc do not require IPA cleaning) This should be performed immediately prior to application of adhesive tape. When using any cleaning solutions it is recommended to test a small area to ensure there is no reaction/discolouration with the surface. It is important to note that all painted/sealed surfaces should be completely dry/cured. (Refer to manufactures recommendations).

### STEP 3 - INSTALLATION PROCESS:

Once the surface has been adequately prepared tape application can commence. Care should be taken to avoid finger contact with adhesive. The portion of tape held by your fingers should overlap the area being applied to & trimmed, as finger contact with any adhesive tape will significantly reduce its performance. Both single & double sided tapes require sufficient rub down pressure to ensure 100% surface contact. Where double sided tapes are being used pressure must be re-applied after both surfaces have been brought together. Surface temperature should be above 10°C at time of application. (Use some heat if necessary - Hair Dryer, Fan Heater etc.).

NB. Storage – Ensure all tapes are stored in clean/dry condition & returned to the protective bag between use.

SPECIAL NOTE: Adhesive Bond Strength will improve with time varying from a few hours to 2-3 days depending on the adhesive tape product used & climactic conditions.

## Disclaimer

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