

3M Transportation Safety Division

ANZ User Guide 3 M™ Reflective Sheeting and HP Latex 360/365 Printers

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3M Transportation Safety Division

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1 Description

3M™ Diamond Grade™ DG3 Reflective Sheeting Series 4000, 3M™ Diamond Grade VIP Reflective Sheeting Series 3990, 3M™ Diamond Grade™ Fluorescent Work Zone Sheeting Series 3924S, 3M™ High Intensity Prismatic Reflective Sheeting Series 3930 and 3M™ Advanced Flexible Engineer Grade Reflective Sheeting Series 7300 are compatible with HP Latex 360/365 printers when used in combination with HP 831 Latex inks.

Series 4000 and Series 3930 sheetings are all backed by the 3M™ ANZ MCS™ Warranty ("MCS Warranty") and 3M™ ANZ MCS Warranty for Traffic ("MCS Warranty for Traffic") when the printing guidelines in this document are followed and 3M ElectroCut™ Film 1170C Clear is applied over the finished graphics. See the Section 12.1 of this document and the separately available warranty matrices for more information on the ANZ MCS Warranties.

Signs printed for temporary traffic use, such as those printed on 3M Diamond Grade Fluorescent Work Zone Sheeting Series 3924s, are not covered as part of the 3M MCS warranty. Such signs do not require overlaminates.

Colors that meet ASNZS 1906.1 requirements for daytime color, nighttime color, luminance factor, and retroreflectivity are referred to herein as traffic colors ("Traffic Colors").

Non-ASNZS 1906.1 defined colors, also known as custom colors ("Custom Colors") or custom color graphics, may be printed on any of the above-mentioned sheetings and, except when signs are produced on Series 3924S or Series 7300 sheetings, or signs are produced without an overlay film applied, are backed by the 3M MCS Warranty.

2 Specifications

Sign constructions discussed in this document conform to the performance requirements described in Table. 1.

Table 1. Summary of Color and Retroreflectivity Specifications of the Sheetings

Sheeting/	Overlay F	Printed Colors C	Characteristic Specification	
3M 3930 (white) / 1170	Traffic BLUE Traffic NZ GREEN Traffic BROWN Traffic RED Traffic DARK GREEN	Daytime color	ASNZS 1906.1:2017 Table 2.6	
		Nighttime Color	ASNZS 1906.1:2017 Table 2.7	
		Luminance Factor	ASNZS 1906.1:2017 Table 2.8	
		Coefficients of Retroreflection (R _A)	70% of ASNZS 1906.1:2017 Table 2.3 (Class 400)	
3M 4000 (white) / 1170	Traffic BLUE Traffic NZ GREEN Traffic BROWN Traffic RED Traffic DARK GREEN	Daytime color	ASNZS 1906.1:2017 Table 2.6	
		Nighttime Color	ASNZS 1906.1:2017 Table 2.7	
		Luminance Factor	ASNZS 1906.1:2017 Table 2.8	
		Coefficients of Retroreflection (R _A)	70% of ASNZS 1906.1:2017 Table 2.3 (Class 1100)	
3M Series 3930 ("HIP") ^a 3M Series 3990 ("VIP") ^b 3M Series 4000 ("DG3") ^c	Traffic BLACK	Opaque		
3M Series 3930 ^a 3M Series 3990 ^b 3M Series 4000 ^c	Custom Colors	No ASNZS 1906.1-defined applications		
3M 3924S	BLACK only	Opaque		
3M Series 7300° No warranties on color or durability provided on Engineer Grade				

^{. 3}M Series 3930 includes: 3930 (white with 1170), 3931 (yellow), 3932 (red), 3935 (blue), 3937 (green), 3939 (brown)

b. 3M Series 3990 includes: 3990 (white), 3991 (yellow), 3992 (red), 3995 (blue), 3997 (green), 3981 (fluorescent yellow), 3983 (fluorescent yellow green)

³M Series 4000 includes: 4090 (white), 4091 (yellow), 4092 (red), 4095 (blue), 4097 (green), 4099 (brown), 4081 (fluorescent yellow), 4083 (fluorescent yellow green), 4084 (fluorescent orange)

d. 3M Series 7300 includes 7310 (white), 7311 (yellow)

3 Printing Guidelines

3.1 Selecting, Storing, Preparing, and Using 3M Retroreflective Sheeting

Do not use damaged rolls of sheeting; doing so can result in head strikes and printer damage. Condition sheeting, ink, and overlaminate by keeping them the same environment as the printer for at least 24 hours before printing. Operate printer under ambient conditions conforming to the parameters presented in Table 2.

Relative humidity range for best print quality	40-60%
Temperature range for best print quality	20-25 °C

Table 2. Use Printer in a Climate-Controlled Room under the Following Conditions

3.2 About Traffic Colors

Differences in color appearance, which are affected by the sheeting, e-cut film, and screen and digital printing processes used, are normal and expected. Although prints made using different combinations of these materials and processes may appear visually different, when prepared by a registered manufacturer per 3M requirements, each satisfies the traffic color requirements indicated in Table 1 and qualifies for $3M^{TM}$ MCSTM Warranty coverage.

Each material and process has a specific range of colors that it can produce. The available color range depends on both the material characteristics and the color pigments used. Different inks and films also have different translucencies, which impact retroreflectivity differently. Each traffic color has a daytime color, nighttime color, and retro-reflectivity specification and a visual color match does not guarantee that a sign construction will meet all specification requirements.

Visual differences are most noticeable when signs are displayed on the same sign post, or otherwise in close proximity, and under similar lighting conditions. Process- and materials-dependent color variations are, and have always been, well known and unavoidable sign construction challenges. If such differences are objectionable, signs to be mounted in close proximity and under similar lighting conditions must be made from the same materials, using the same processes.

3.3 3M MCS Warranty for Traffic and Printer Conditions

As stated in Section 3.2, when the guidelines presented in this document are followed, durable signs are produced and the registered manufacturer user is entitled to the benefits of the 3M MCS Warranty for Traffic. However, altering any of several operating conditions voids the 3M MCS Warranty for Traffic. These warranty-voiding actions are discussed presently, before details of how to operate a HP Latex 360/365 printer under warranty conditions are discussed.

Note: Review Tables 3 and 4 before making (or allowing any third party to make) any changes to printer conditions.

3M has designed Traffic Colors to be printed on 3M sheeting using a HP 360/365 printer and 3M Flexi for use in the production of traffic signs that meet the color, retroreflectivity, and weathering durability regulations of various regions around the world. The HP 360/365 printer is a complex machine with many variables that are often adjusted by endusers when producing commercial graphics and other non-regulated images. It is imperative that many of the changes frequently used in the production of non-regulated commercial graphics NOT be employed when printing regulated traffic signs. Modify print conditions only by following the recommendations presented in Tables 3 and 4 below. Unless written guidance has been provided by a 3M representative, signs produced using settings not conforming to these tables will not carry the 3M MCS Warranty for Traffic.

Table 3. Permitted Settings Changes

НР	Printer Media/Substrate Settings	Editing Constraints	Current Setting
Curing Temperature (°C)		May adjust within a range of 99-110 °C Must perform drying test described below ^a and adjust inter-pass delay accordingly ^b	107
Inter-pa	ass Delay (ms)	Increase if temperature drops ^b	200
Air Flov	v Pressure (mm H ₂ O)	May adjust according to HP recommendations	180
Vacuum	(mm H ₂ O)	May lower Too low will result in more frequent head strikes Too high might result in visible banding on thinner sheeting (eg. 7300/7600)	80
OMAS (On/Off)		Turn off in the event of length accuracy issues	Off (default)

- a. IMPORTANT Drying Test: Print a file with traffic color blocks using the new settings. The file can be similar to that described in Section 4.5. Subject the unlaminated sample to typical room conditions for at least 6 hours, or leave overnight. If any of the ink appears to re-wet or looks oily on the surface at any time, drying conditions are insufficient.
- b. Adjust according to HP standard recommendations, which account for the interdependence of curing temperature and inter-pass delay; traffic sheeting type should not affect either setting.

Table 4. Prohibited Setting Changes

HP	Printer Media/Substrate	Settings	Editing Constraints	Current Setting
Printer I	Ink Limit (%)		Change prohibited	150
Number of Passes			Change prohibited	12
Optimize	er (%)		Change prohibited	4
Efficiency Mode			Change prohibited	Off

4 Initial Setup

The following steps will ensure accurate printing of Traffic Colors using a HP Latex 360/365 printer:

- Install Flexi Authorized 3M Traffic Edition software
- Verify that the printer's firmware is current and update if necessary
- Contact your local 3M Sales representative to register your printer
 - Setting up the media profiles for ANZ region
 - Install media files from online HP Substrate Library and edit to the 3M ANZ provided settings OR
 - Import the 3M ANZ supplied profiles and update the printer via the Web interface
- Perform color calibration
- Print and mail color checker file

4.1 Install Flexi Authorized 3M Traffic Edition Software

SAi Production Manager, Authorized 3M Traffic Edition 12 or higher, comes pre-installed with presets for HP Latex printers. These presets include color formulations that properly match Traffic Signage standards on 3M sheeting. Those presets may not have all the necessary color formulations for the ANZ region. Contact your local 3M sales representative for those.

To install:

- a. Locate the activation voucher provided by SAi.
- b. Create an account at www.saicloud.com and activate the license.
- c. Follow the link to the SAi software download page.
- d. Download and install the software (SAi Production Manager, Authorized 3M Traffic Edition 12 or higher).
- e. Upon launching software for first time, input printer model number and IP address, when prompted.

More detailed information available at: https://youtu.be/izQ5SxtuiR8 (note that the activation code is provided by SAi, rather than with the Latex 360/365 printer as shown in the video).

Once the RIP software, Flexi Production Manager, detects the newly installed media presets, it will request to synchronize. Synchronization completes in a few minutes, then the printer and RIP software are ready to print.

4.2 Verify Latest Firmware

On the printer's front panel, navigate to the firmware update page: **Printer > Firmware Update > Check updates.**

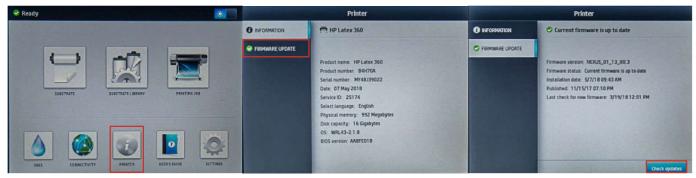


Figure 1. Screen navigation to view latest firmware.

4.3 Printer Registration

By taking a few minutes to register your printer you can validate your 3M product warranty(ies), be privy to developments in digital sign printing technology, enjoy extended support, receive product alerts, and more. Contact your local 3M Sales representative to register your printer by providing them the following information:

- Your business name
- Printer operator contact details
- Printer make and model
- Printer Inks
- Printer serial number

4.4 Install Media Files on Printer

Table 5. Media File Names by Sheeting Product and Use

		Use		
Substrate	Media File Name	Information Signs (Custom Colors)	Temporary Traffic Signs (Traffic BLACK only)	Warning, Regulatory, and Guide Signs (Traffic Colors)
3M Series 7300	3M 7300 Traffic Colors v3	✓	√	
3M Series 3930	3M 3930 Traffic Colors v3	✓	✓	✓
3M Series 3990	3M 3990 Traffic Colors v3	✓	✓	
3M Series 4000	3M 4000 Traffic Colors v3	✓	✓	✓
3M 3924S	3M 3924 Preset for Black only images		√	

1. Press the **Substrate Library** button on the 2. Select the **Online search** option and filter the main printer menu. results by Brand (**3M Commercial Graphics**).



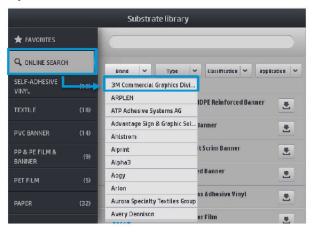


Figure 2. Searching the online library for media files.

Once the media file has been located, click on the download symbol () on the right. Media file download and installation will then occur without further user input. Repeat for each required media file.

4.5 Perform Color Calibration

The printer's color calibration status can be checked as shown in Figure 3 at any time.

The printer's internal calibration equipment requires non-reflective material. 3M IJ180 self-adhesive vinyl is required for 3M Traffic Color calibration.

- a. Load a roll of 3M IJ180 self-adhesive vinyl onto printer.
- b. On the printer's front panel, select the reflective sheeting to be calibrated.
 c. See Figure 4 for screen navigation to perform color calibration. Click: Settings > Image Quality Maintenance > Color Calibration > Calibrate.

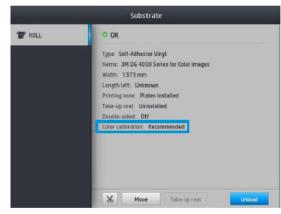


Figure 3. Color calibration status screen.

d. Once calibration process has finished, load reflective sheeting print medium onto printer.



Figure 4. Screen navigation to perform color calibration.

4.6 Print and Mail Color Checker File

Note: These next steps are not required for black-only temporary traffic signs, they are required however to validate your warranty(ies).

Open FlexiPRINT and draw a 10cm x 10cm square for each traffic color in a pattern that fits the width of the media being used. Next, use the **Fill/Stroke Editor** to fill each square with a 3M Traffic Color, as shown to the right, in Figure 5.

Laminate the print with 1170 overlaminate film, as described in Section 7, and label the back of it with the following:

- a. Date printed
- b. Printer model and serial #
- c. Name of sign shop
- d. Email address for correspondence

Send the color checker print as a strip or cut into squares, to:

Kosta Karagiannopoulos 3M Australia Building A, 1 Rivett road North Ryde, NSW 2113

IMPORTANT:

Wait for evaluation of your samples by 3M to ensure your prints meet the MCS output requirements before going into production.

IMPORTANT: refer to section 5 before printing color checkerto ensure correct settings are used.

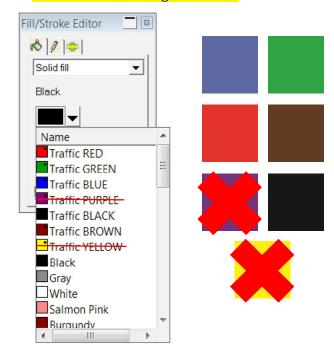


Figure 5. Location of 3M Traffic Colors (left) and example of color check sample square array (right).

5 Printing

When printing for traffic applications, follow these software and physical procedures to ensure expected output and long-term functionality of your HP printer solution. This section presents specific instructions for printing on 3M reflective sheeting. For other print constructions, follow the instructions available in the HP Latex 300 Printer Series User's Guide.

Because of the weight of 3M reflective traffic sheeting, it is recommended that the main feed and take up reels be used in the second position from the right, as shown in Figure 6.



Figure 6. Proper traffic sheeting spindle loading location.

Because of its rigidity, printing on <u>3M reflective traffic sheeting requires the use of edge holders</u>. A variety of edge holder types are available. Work with your HP reseller to determine what holder best suits your application. If "butterfly" edge holders (which are mounted back-to-back to give greater media coverage) are used, the onboard cutter option cannot be used or the user risks severely damaging the printer. The onboard cutter option may be safely used with paper, vinyl, and other non-traffic sheeting media only after "butterfly" edge holders have been removed entirely.



Figure 7. Edge holder.

Load 3M sheeting so that the leading edge lies beyond the metal curing platform. Failure to feed the leading edge past the metal curing platform can result in significant buildup of adhesive residue, which in turn can lead to a variety of significant printing issues.



Figure 8. Leading edge of sheeting resting beyond metal curing platform prior to printing.

The take up reel should be used for all print jobs. It increases tension, which helps to hold the rigid sheeting against the platens, ensuring consistent print quality and helping to prevent head strikes.

When asked, select the correct media file from the **Substrate Library** menu. The media files for 3M reflective sheetings are found in the **Self-Adhesive Vinyl** media folder.

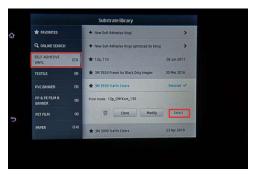


Figure 9. Select appropriate media file from Self-Adhesive Vinyl folder of the Substrate Library.

After selecting the media file, press the **Substrate** button on the front panel and verify that the color calibration line reads "OK," indicating it is still current. If it reads "Recommended" or "Obsolete," follow procedure described in Section 4. **Color calibration is required for finished signs to be covered by the 3M™ MCS™ Warranty for Traffic.**

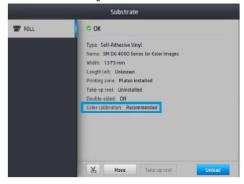


Figure 10. Color calibration status screen.

With the design file open in FlexiPRINT, use the Fill/Stroke Editor to fill areas of the sign with the appropriate 3M Traffic Colors. This includes replacing any black areas with Traffic BLACK. (Figure 11)

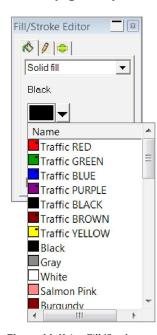


Figure 11. Using Fill/Stroke editor in FlexiSIGN to color with Traffic Colors.

Once the image has the correct coloring, save the file and open it in the Flexi Production Manager RIP software. To do so, select **Add Job** (Figure 12) and navigate to the file to bring it into the hold queue. Next, double click on the job in the queue to open the **Default Job Properties** dialogue box (Figure 13).



Figure 12. Adding a job in Production Manager.

Next, verify that the value displayed in the drop-down menu at the top of the dialogue box labeled **Preset**: matches the media loaded into the printer (e.g. ensure the 3930 preset is selected if the printer is loaded with 3M 3930 High Intensity Prismatic sheeting). After making any required changes (print size, number of copies, etc.), click on the third tab from the left to view the color handling properties. Here, verify that **Use color correction** is selected and all of the other drop-down menus are populated as shown in Figure 13. Also, verify that the box labeled **Use color mapping** is checked.

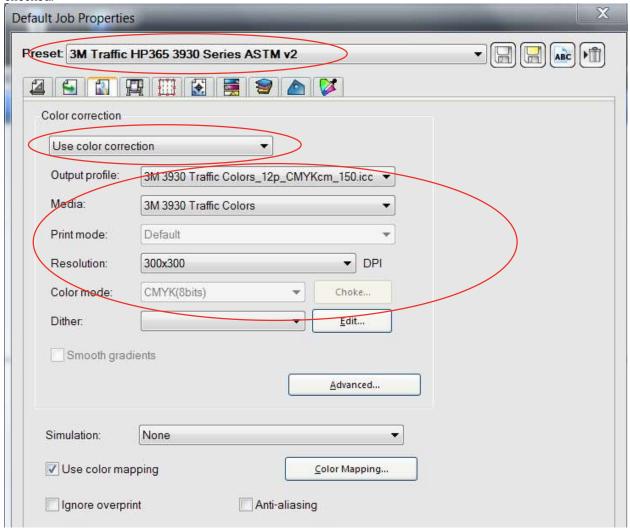


Figure 13. Verifying color print job properties before printing

Next, click on the **Media Management** tab, the fourth tab from the left, and verify that the settings match the **Printer Profile** settings shown in Figure 14.

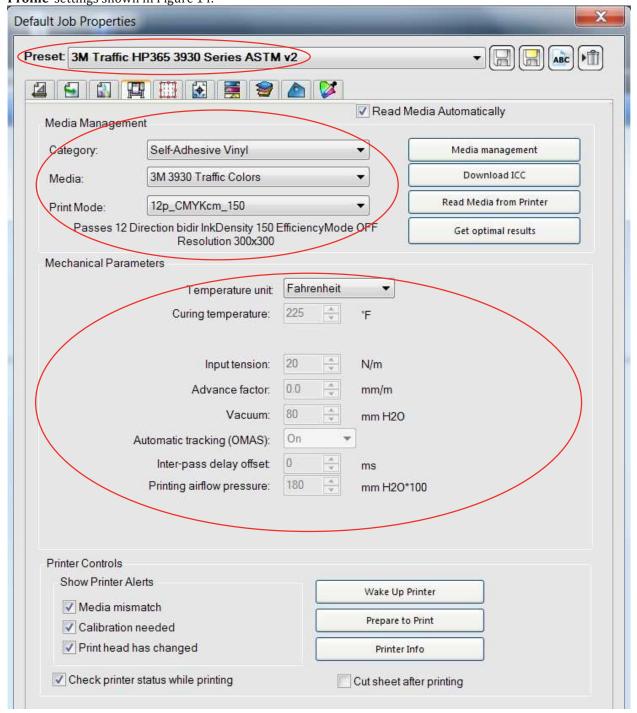


Figure 14. Verifying print job output properties before printing

Once all settings have been confirmed, the job can be sent directly to print or held in the RIP queue like any other print job. Verifying the settings is an important step in making sure that each job prints accurately on the selected 3M sheeting material.

5.1 Alternative Printing Workflow

Some sign libraries are organized such that the "RIP and Print" feature of FlexiSIGN presents a more convenient workflow. The RIP and Print feature is conveniently accessed with a single click, as shown in Figure 15.



Figure 15. Location of the RIP and Print button, which can also be accessed using the Ctrl + H keyboard shortcut.

Clicking on the **RIP** and **Print** button opens a dialogue box similar to the Job Properties dialogue box found in the Production Manager. Choose **Hold in list** on the first tab of the Rip and Print dialogue box to prevent the accidental selection of an incorrect preset or other setting. The print file must be processed through the Production Manager RIP to properly convert Traffic Colors.

Note: A warning box may appear indicating a settings mismatch between RIP and Print and Production Manager. If this warning appears, click **Use PM Settings**.

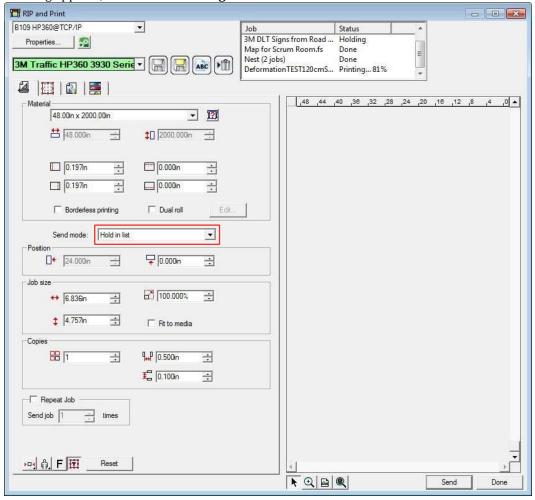


Figure 16. Location of Hold insetting.

Once the Hold in list processing option has been selected, open Production Manager and verify that all settings are correct, as described in Section 4.5.

Click Send to print.

6 Basic Troubleshooting

If issues arise during printing, the following strategies should be used to obtain assistance.

For issues with the inks, printing on non-3M media, or other general printer performance issues, please work with HP and your HP reseller Latex support teams to find satisfactory solutions.

If issues occur when printing on 3M traffic sheeting, load a roll of non-traffic material (paper, generic vinyl, etc.) and print file using the appropriate media file for the non-traffic sheeting material. If the problem persists on the non-traffic material, then work with the HP and HP reseller support teams. HP Technical Support can be reached at 13 10 47.

If the problem appears only when printing on 3M traffic sheeting, please call HP Technical Support at 13 10 47 and start a case. After starting a case with HP, send an email to **KKaragiannopoulos@mmm.com** and provide your HP case number along with details relevant to the printing issue.

7 Application of Overlaminate

Printed images must be dry before being overlaminated with 3M™ ElectroCut™ Film 1170C Clear. See Table 3 footnote for details. Lamination should be performed using a laminator that meets the following criteria:

- 1. Roll to roll, manual squeeze roll, or flat-bed laminator.
- 2. Between 122cm (48") and 165cm (65") wide.
- 3. Equipped with a pneumatically controlled nip (preferred but not required).
- 4. Equipped with rubber covered nip rolls capable of a minimum nip pressure of 7 pounds per lineal inch.
- 5. Equipped with rolls with Shore A durometer of 60 or higher (preferred but not required).
- 6. Follow the laminator manufacturer's instructions.

Note: If trapped air is observed between ink and overlaminate, consider increasing pressure and/or temperature and/or lowering lamination speed.

8 Durability

The durability of 3M reflective sheeting will depend upon substrate selection and preparation, compliance with recommended application procedures, geographic area, exposure conditions, and maintenance practices.

Maximum durability can be expected in applications subject to vertical exposure on stationary objects when processed and applied to aluminum prepared according to the 3M recommendations provided in 3M Information Folder 1.7. 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, or exposure to severe or unusual conditions can shorten the performance lifetimes 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.

9 Storage of Completed Signs

Completed signs must be protected with SCW 568 slip sheet paper and stored on edge. Placing the glossy side of the slipsheeting against the sign face. Double-faced signs must have the glossy side of slip sheeting against each face of the sign. Unmounted processed faces must be stored flat and interleaved with SCW 568 slip sheeting, glossy side against the sign face. Maximum stack height is five inches.

Avoid banding, crating, or stacking signs. Package for shipment in accordance with commercially accepted standards to prevent movement and chafing. Store sign packages indoors on edges.

10 Environmental, Health, and Safety

CAUTION: When handling any chemical products, read the manufacturers' container labels and the Safety Data Sheets (SDS) for important health, safety, and environmental information. To obtain SDS sheets for 3M products, go to 3M.com/SDS or in case of an urgent need, call 136 136. HP SDSs for inks can be found at the HP website. For 3M product questions or issues, contact the 3M helpline 136 136.

When using any equipment, always follow the manufacturer's instructions for safe operation.

11 Disclaimer

With the exception of 3M branded products, 3M does not represent that any printer or printer accessory recommended in 3M literature will meet customer requirements, any applicable safety standards, or any federal, state, or local regulations. Such determination is the responsibility of the printer owner. For a buyer's convenience, 3M may provide engineering or technical information, recommendations, certifications, and other information or materials relating to other company's products ("Other Information"), but 3M does not warrant Other Information, including but not limited to, its accuracy or completeness.

12 Warranty Information

12.1 Limited Warranty

For warranty information, please refer to the 3M ANZ Digitally-Imaged Sign Warranty Bulletin and the 3M[™] ANZ MCS[™] Warranty for Traffic Matrix for HP Latex 360/365 Printers.

12.2 Limitations of Liability

EXCEPT WHERE PROHIBITED BY LAW, 3M WILL NOT BE LIABLE FOR ANY LOSS OR DAMAGE ARISING FROM THE 3M PRODUCT, WHETHER DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL, REGARDLESS OF THE LEGAL THEORY ASSERTED, INCLUDING WARRANTY, CONTRACT, NEGLIGENCE, OR STRICT LIABILITY.

13 Other Product Information

Always confirm that you have the most current version of the applicable product bulletin, information folder, or other product information from 3M's Website at http://www.3M.com.au/RoadSafety

14 Literature Reference

3M IF 1.7 3M™ Reflective Sheeting Sign Base Surface Preparation

3M IF 1.11 3M[™] Reflective Sheeting Sign Maintenance Management

3M PB 1170 3M™ ElectroCut™ Film Series 1170

3M PB 7300 3M[™] Advanced Flexible Engineer Grade Reflective Sheeting Series 7300 (ANZ)

3M PB 3924S 3M™ Fluorescent Orange Prismatic Work Zone Sheeting Series 3924S Sheeting With Pressure

Sensitive Adhesive

3M PB 3930 3M[™] High Intensity Prismatic Sheeting Series 3930

3M PB 3990 3M[™] Diamond Grade[™] VIP Reflective Sheeting Visual Impact Performance (VIP) Series 3990

3M PB 4000 3M[™] Diamond Grade[™] DG3 Reflective Sheeting Series 4000

3M ANZ Digitally-Imaged Sign Warranty Bulletin

3M™ ANZ MCS™ Warranty Matrix for HP Latex 360/365 Printers

3M™ ANZ MCS™ Warranty for Traffic Matrix for HP Latex 360/365 Printers

HP Latex 300 Printer Series User's Guide - available on printer

ASNZS 1906.1 Test Methods are available from Standards Australia.

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All statements, technical information and recommendations contained herein are based on tests we believe to be reliable at the time of this publication, but the accuracy or completeness thereof is not guaranteed, and the following is made in lieu of all warranties, or conditions express or implied. Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage, direct, indirect, special, or consequential, arising out of the use of or the inability to use the product. Before using, user shall determine the suitability of the product for his/her intended use, and user assumes all risk and liability whatsoever in connection therewith.

Statements or recommendations not contained herein shall have no force or effect unless in an agreement signed by officers of seller and manufacturer.



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