

Transportation Safety Division

# Digital Imaging with Durst 163TS Printers on 3M™ Reflective Sheeting

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## 1 Description

3M™ Diamond Grade™ DG<sup>3</sup> Prismatic Reflective Digital Sheeting Series 4000DS and 3M™ High Intensity Prismatic Reflective Digital Sheeting Series 3930DS are compatible with the Durst Rho 163TS and Durst Rho163TS-HS printers in combination with 3M™ ElectroCut™ Film 1170C Clear Overlaminates and 3M™ Piezo™ Inkjet Series 8900UV Ink. This compatibility is backed with a [3M™ MCS™ Warranty](#) and [3M MCS Warranty for Traffic](#) when the printing guidelines in this document are followed. See the “Limited Warranty” section of this document for more information on the MCS Warranties.

3M™ Advanced Flexible Engineer Grade Reflective Sheeting Series 7300 is compatible with the Durst Rho 163 printers in combination with 3M ElectroCut Film 1170C Clear Overlaminates and 3M Piezo Inkjet Series 8900UV Ink. This combination is not covered by the [3M MCS Warranty](#) or [3M MCS Warranty for Traffic](#).

Traffic colors can be printed with Durst 163TS printers on Series 4000DS and Series 3930DS sheetings using 3M Piezo Inkjet Series 8900UV Inks. When printed and laminated with 3M ElectroCut Film 1170C Clear Overlaminates following the guidelines below, these colors are backed by the [3M MCS Warranty for Traffic](#).

Non-regulated signage, which may include process color graphics, may also be printed using Durst 163TS printers on Series 4000DS and Series 3930DS sheetings using 3M Piezo Inkjet Series 8900UV Inks. When printed

and laminated with 3M ElectroCut Film 1170C clear overlamine following the guidelines below, these colors are backed by the [3M MCS Warranty](#).

Traffic colors and non-regulated signage, which may include process color graphics, can also be printed with the Durst Rho 163 printers on Series 7300 sheeting using 3M Piezo Inkjet Series 8900UV Inks and laminated with 3M ElectroCut Film 1170C Clear Overlamine following the guidelines below.

**Table 1. Summary of color and retroreflectivity specifications.**

Sheeting/Overlay	Printed Colors	Characteristic	Specification
3M Series 4000DS / 1170C	Regulated Traffic Colors <sup>a</sup>	Daytime Color	ASTM D4956 Table 11
		Nighttime Color	ASTM D4956 Table 13
		Luminance Factor	ASTM D4956 Table 2
		Coefficients of Retroreflection (R <sub>A</sub> )	70% of ASTM D4956 Table 10 (Type XI)
3M Series 3930DS / 1170C	Regulated Traffic Colors <sup>a</sup>	Daytime Color	ASTM D4956 Table 11
		Nighttime Color	ASTM D4956 Table 13
		Luminance Factor	ASTM D4956 Table 2
		Coefficients of Retroreflection (R <sub>A</sub> )	70% of ASTM D4956 Table 5 (Type IV)
3M Series 7300 / 1170C	Regulated Traffic Colors (Red, Blue, Yellow, Green, Brown)	Daytime Color	ASTM D4956 Table 11
		Nighttime Color	ASTM D4956 Table 13
		Luminance Factor	ASTM D4956 Table 2
		Coefficients of Retroreflection (R <sub>A</sub> )	70% of ASTM D4956 Table 1 (Type I)
3M Series 4000DS / 1170C 3M Series 3930DS / 1170C 3M Series 7300 / 1170C	Traffic Black	Opaque	
3M Series 4000DS / 1170C 3M Series 3930DS / 1170C 3M Series 7300 / 1170C	Process Colors	Non-regulated applications only	

a. Please refer to the 3M Warranty Matrix for warranty details.

## 2 Printing Guidelines

There are several steps to producing a regulated traffic sign using the Durst 163TS printers. Please follow them carefully as the most successful and durable signs are achieved when all of the following criteria are met.

### 2.1 Setup to Print Traffic Colors

In order to achieve proper color and retroreflectivity, both the design software and the RIP software must be set up exactly as specified by 3M. Any sign design software that is able to export a PDF and name spot colors can be used. However, the spot color names used in the sign design software must exactly match those preloaded into the RIP software. Therefore, to access proper color definitions and print accurate regulated traffic colors, sign designs must refer to spot colors exactly as they appear in the list below.

- Traffic BLUE
- Traffic GREEN
- Traffic RED
- Traffic BLACK

- Traffic BROWN
- Traffic PURPLE
- Traffic YELLOW
- Traffic ORANGE

**Note:** If proper color definitions are not used, signs may be produced that do not meet the color and retroreflection specifications described above. Such signs produced on 3M™ High Intensity Prismatic Reflective Digital Sheeting Series 3930DS and 3M™ Diamond Grade™ DG<sup>3</sup> Prismatic Reflective Digital Sheeting Series 4000DS will not be covered by the 3M MCS Warranty for Traffic. As previously stated, the MCS Warranty does not apply to 3M™ Advanced Flexible Engineer Grade Reflective Sheeting Series 7300.

## 2.2 Selecting, Preparing, and Using 3M Retroreflective Sheeting

Do not use damaged rolls of sheeting, as this can result in head strikes and printer damage. Condition the sheeting, ink, and overlamine for 24 hours in the same environment as the printer before using.

## 2.3 Operation and Maintenance Procedures

Printer maintenance is very important in the production of high-quality signs and graphics. Follow all operation and maintenance procedures recommended by the printer manufacturer.

## 2.4 Printing Traffic Colors

Prior to printing, verify that the correct traffic spot colors for the areas of the sign to be printed with regulated traffic colors have been selected in the design software. A complete list of traffic spot colors and their exact respective fill levels will be preloaded onto the printer prior to installation and should not be altered. Traffic spot colors must be specified in traffic sign designs in order to ensure proper regulated traffic colors are achieved. The design file must then be exported as a PDF, with no color correction, to a location accessible to the Caldera RIP software.

The settings shown in Table 2 and Table 3 are in the preset and must be used to ensure proper traffic color output. They should not be altered for any reason.

Please note that the settings presented in Table 2 and Table 3 do not include all of the settings that can be set within the Durst operating software, only those that are key to making regulated traffic signs. For more information or questions regarding this section, please contact your 3M representative.

**Table 2. Traffic signs high speed mode preset settings (with and without the use of holddowns)**

Sheeting Type	Sheeting Name	Material Thickness (Inches)	Head Height (Inches)	Print	UV Setting	Leading Cure Lamp Setting	Trailing Cure Lamp Setting	Vacuum Setting
3M Series 4000DS	DG <sup>3</sup>	0.0201	0.079	Bi-Directional	Matte	13	13	16
3M Series 3930DS	HIP	0.0201	0.079	Bi-Directional	Matte	13	13	16
3M Series 7300	Advanced Flexible EG	0.0150	0.079	Bi-Directional	Matte	15	15	13

**Table 3. Traffic signs standard speed mode preset settings.**

Sheeting Type	Sheeting Name	Number of Passes	UV Setting	Cure Lamp Setting	Vacuum Setting
3M Series 4000DS	DG <sup>3</sup>	Bi-Directional	Glossy	13	16
3M Series 3930DS	HIP	Bi-Directional	Glossy	13	16
3M Series 7300	Advanced Flexible EG	Bi-Directional	Matte	13	16

## 2.5 Application of Overlamine

Printed images must be cured before being overlaminated with 3M ElectroCut Film 1170C Clear Overlamine. Lamination should be performed using a laminator that meets the following criteria:

- 1 Roll to roll laminator
- 2 Minimum 48" wide, Maximum 65" wide
- 3 Top nip roll heated to 150 °F
- 4 Pneumatically controlled nip preferred
- 5 Rubber covered nip rolls capable of a minimum nip pressure of 7 pounds per lineal inch
- 6 Speed variable from 0-10 feet per minute
- 7 One unwind shaft for printed sheeting
- 8 One unwind shaft for overlamine
- 9 One rewind shaft for finished product
- 10 One rewind shaft for overlamine liner

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

## 2.6 Environmental Specifications

For best print quality, use the printer in a climate-controlled room conforming to the parameters presented in Table 4.

Table 4. Relative humidity and temperature ranges for best print quality

Relative humidity range	30-50%
Temperature range	68-77 °F

## 3 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. Maximum durability can be expected in applications subject to vertical exposure on stationary objects when processed and applied to properly prepared aluminum according to 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 reduce durability.

## 4 Storage

Completed signs must be protected with SCW 568 slipsheet paper and stored on edge. Place the glossy side of the slipsheet paper against the sign face. Double-faced signs must have the glossy side of slipsheet paper against each face of the sign.

Unmounted processed faces must be stored flat and interleaved with SCW 568 slipsheet paper with the glossy side of the paper 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.

For processing, storage, packaging, and cleaning information, please refer to [3M Information Folder 1.11](#).

## 5 Environment, Health, and Safety

**CAUTION:** When handling any chemical product, read all 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](http://3M.com/SDS), request by mail, or in case of an urgent need, call 1-800-364-3577.

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

## 6 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 federal, state, or local regulations, or any applicable safety standards. 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.

## 7 Warranty Information

### 7.1 Limited Warranty

For warranty information, please refer to the [3M Digitally-Imaged Sign Warranty Bulletin](#), [3M MCS Warranty Matrix for Durst 163TS and 163TS-HS](#), and [3M MCS Warranty for Traffic Matrix for Durst 163TS and 163TSHS](#).

### 7.2 Limitation 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.

## 8 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/roadsafety>.

## 9 Literature References

Before starting any job, be sure you have the most current Product and Instruction Bulletins.

<a href="#">3M IF 1.7</a>	Sign Base Surface Preparation
<a href="#">3M IF 1.11</a>	Sign Maintenance Management
<a href="#">3M PB 1170</a>	3M™ ElectroCut™ Film Series 1170
<a href="#">3M PB 7300</a>	3M™ Advanced Flexible Engineer Grade Series 7300
<a href="#">3M PB 3930DS</a>	3M™ High Intensity Prismatic Reflective Digital Sheeting Series 3930DS
<a href="#">3M PB 4000DS</a>	3M™ Diamond Grade™ DG <sup>3</sup> Prismatic Reflective Digital Sheeting Series 4000DS
<a href="#">3M PB 8900UV</a>	3M™ Piezo Inkjet Series 8900UV Ink

ASTM Test Methods are available from ASTM International, West Conshohocken, PA.

## For Information or Assistance

Call: 1-800-553-1380 In

Canada Call:

1-800-3M HELPS (1-800-364-3577)

Internet: <http://www.3M.com/roadsafety>

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