3M

Process Color

Series 990

Product Bulletin 990 **July 2010**

Replaces PB 990 dated January 2008

Description

3M™ Process Color Series 990 is transparent (except for 990-05 black which is opaque), screen printable, and quick-drying. Colors are weather resistant, have excellent color retention, and do not require clear coating. They are recommended and intended for use on 3M™ Engineer Grade Series 3200 and Series CW80 Reflective Sheetings. Application to other grades or types of reflective sheeting or substrates is not recommended and may result in premature product failure after outdoor exposure.

Series 990 process colors result in evaporation of more solvent in less time than slower drying inks; therefore, when they are dried in large volumes, sufficient ventilation and exhaust should be provided (see Information Folder 1.12 for exhaust and ventilation requirements).

The following Series 990 colors, toner, and thinner are available:

T-11A Thinner
990-00 Toner
990-03 Blue
990-04 Yellow (Warning)
990-05 Black (Opaque)
990-06 Orange
990-07 Brown
990-08 Green
990-12 Traffic Sign Red
990-13 Violet
990-14 Lemon Yellow
990-15 Magenta
991 Thinner/Retarder

Series 990 process colors are intended for use as a matched component in the production of traffic control signs. Signs made of these materials will have a similar appearance viewed from a vehicle either in the daylight or at night.

Series 990 process colors should not be blended or mixed with any other series of process colors produced by 3M or other manufacturers. 3M assumes no responsibility for premature failure of sign face legends that have been screen processed with non-3M process colors. 3M does not recommend inks made by other manufacturers.

Screen Processing

1. Equipment Set-up and Process Procedures

1.1 Proper color and durability is achieved by using a high grade monofilament polyester screen fabric of PE 157 mesh size. Other size and type of screen fabric will not produce acceptable finished color tone or satisfactory signing outdoor durability.

1.2 Screen processing should be accomplished by using off contact screening techniques. Direct contact screen printing should not be used. Refer to Information Folder 1.15 for proper off contact and other screening techniques.

1.3 Be sure that screens, sheeting and the screening and drying areas are clean of dust, dirt and lint.

1.4 Screen stencils should be the high quality water soluble type that will resist ketone and strong lacquer solvents.

1.5 A 50-60 Durometer squeegee is recommended for application of 990 inks.

2. Coverage

2.1 The coverage of Series 990 process colors, applied as recommended, will be approximately 1000 - 1200 square feet (90 - 110 square meters) per gallon.

3. Mixing and Thinning

3.1 It is important that all process colors and substrates to be screened be brought to normal ambient room temperature and humidity conditions of the screen processing area prior to screening.

3.2 The series 990 inks are formulated to be at screening viscosity directly out of the can. If a lower viscosity ink is needed for screening, there are two choices for thinners. The T11A is a general purpose thinner that will work in most applications. The 991 thinner/retarder is a more specialized thinner that will slightly increase drying times and should be used if drying in the screen is a problem. Thinners should be added sparingly and only to a point that results in a good quality screened image. Over-thinning may result in screening errors such as non-wets or "fisheyes". A good rule is to add thinner until the color lifted with the stationary propeller "piles," just slightly, on the surface as it flows back into the container.

3.3 Inks must be premixed prior to use. Shake for at least one minute by paint shaker or three minutes by hand if a paint shaker is unavailable. For best results, after shaking, pour into an open can and mix with a propeller-type high speed mixer for at least five minutes. Let stand for one hour. Cover as soon as possible after mixing and during use.

3.4 Addition of drying agents, or extenders, is not recommended, and can adversely affect process color adhesion and outdoor durability.

3.5 Colors should be used within 1 year of receival date, and should be replaced if there is any sign of contamination.

Note: If at all possible the mixing and thinning should be done the night before, and then just before screening, hand mix with a spatula.

4. Clear Coating - Edge Sealing

4.1 Clear coating and edge sealing are not required or recommended for Series 990 process colors applied to Series 3200 or CW80 sheeting.

5. Drying

NOTE: Adequate exhaust ventilation must be provided in the screening and drying areas to prevent a build up of solvent vapors which may affect drying or create a health or fire hazard. (See Information Folder 1.12 for exhaust and ventilation requirements.)

5.1 Air Drying – Signs to be air dried must be racked on open racks to allow adequate air circulation. High volume fans must be directed through the racks. Drying times will be increased by high humidity, low temperature, poor air circulation, heavy color coat, and excessive thinning. Air drying is best done at shop temperatures of 60-100˚F (15-38˚C) and relative humidity levels of 20 – 50%.

Flow Out Time: 10 – 20 minutes
Between Colors: 2 hours
Final Color: 3 hours

5.2 Oven Drying – Signs to be oven dried must be racked individually with at least 2 inches (5.1 cm) open space between racks for unobstructed air flow. Drying times may vary with the oven equipment. Oven dry all screened sheeting where premasked or tape carrier applications or where tape hinges are used.

Flow Out Time: 10 – 20 minutes (in air before oven drying)
Between Colors: 30 minutes @150˚F (65˚C)
Final Color: 30 minutes @150˚F (65˚C)

If the screen printed materials are not sufficiently dried, blocking or sticking of the colors to slipsheeting or to the materials themselves may occur when packaged for storage or shipment.

5.3 Conveyor Drying – Signs to be dried must be placed to allow unobstructed air flow. Conveyor oven should be adjusted to allow at least 15 seconds flow out time and at least 90 seconds in the heat zone. A chiller is needed as the final stage if immediate packaging is planned. Temperatures stated are at sign face and not necessarily oven temperatures.

Flow Out Time: 15 seconds
Between Colors: 90 seconds @ 150˚F (65˚C)
Final Color: 90 seconds @ 150˚F (65˚C)

6. Screen Cleaning

6.1 The following companies have solutions and systems to clean screens:

1. Easiway Systems, Inc.
   540 River Street
   P.O. Box 70
   Delano, MN 55328
   Tel. 800/950-3279
   Fax. 612/972-6206
2. Intercontinental Chemical Corporation (ICC)
   4660 Spring Grove Ave.
   Cincinnati, OH 45232
   Tel. 800/543-2075

These solvents or mixtures may be used for cleaning screens and equipment.

1. Four parts DPM1 - one part methylethyl-ketone
2. Xylol (Xylene)
3. Lacquer Thinner
4. T - 11A Thinner

NOTE: The first three solvents listed above are for cleaning only and should not be used as thinners for process colors. Use only T - 11A or 991 as thinners for Series 990 process colors.

6.2 For all cleaners, a final wipe with T - 11A thinner is recommended, to remove any residual contamination in the screen.

6.3 Should the screen become clogged or dried in with ink, the screen can be reopened by lightly wiping with T - 11A thinner, xylol, or a 50/50 mixture of xylol and isophorone.

6.4 CAUTION: When using solvents for clean up, it is essential that proper safety precautionary measures be observed, as recommended by the solvent manufacturer for handling such materials.

7. Slipsheeting and Packaging

7.1 Applied, screened signs may be protected with the liner from the reflective sheeting or with SCW-586 as slipsheet. Place glossy side of the slipsheet against the sign faces and package face to face and back to back. Double faced signs must have slip sheet protecting both faces of the sign.

7.2 Unapplied, screened faces do not require a slipsheet interleaved between the faces. The top face, on the stack, should be protected with slipsheet material.

8. Storage

8.1 Series 990 process colors need to be stored away from excessive heat or cold conditions, at temperatures between 60˚-80˚F (16˚-27˚C) and used within one year of the date of receival.

8.2 Dispose of all used process colors from screening. Contamination of fresh colors may occur if used process colors are mixed with fresh colors.

General Performance Considerations

Series 990 colors screen processed according to the recommendation of 3M can be expected to provide the same effective field performance as the sheeting on which it is applied.

Durability will be substantially reduced by toning the colors.

The durability of sheeting or screen processed sheeting exposed in any position other than vertical or near vertical may be significantly reduced. Contact your 3M sales representative to clarify the durability of such applications. See sheeting product bulletins for specific warranty details.

Environmental, Health and Safety Information

Read all health hazard, precautionary and first aid statements found in the Material Safety Data Sheet, and/or product label of chemicals prior to handling or use.

Consult federal, state and local air quality regulations that may regulate or restrict product use.

Literature References

IF 1.7	Surface Preparation of Substrates
IF 1.8	3M™ Series 700, 880, and 990 Process Color instructions for use on 3M™ Reflective Sheetings
PB 3200	3M™ Engineer Grade Reflective Sheeting Series 3200
PB CW80	3M™ Engineer Grade Work Zone Sheeting Series CW80

FOR INFORMATION OR ASSISTANCE
CALL:
1-800-553-1380

IN CANADA CALL:
1-800-265-1840

Internet:
www.3M.com/tss

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All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, 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, 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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