Scotchcal ™
Film Series 220

Description

Advantages

- Designed for electronic cutting
- Gerber EDGE READY ™
- Durable, dimensionally-stable, cast vinyl film
- Withstands severe weather and handling conditions
- Wide range of glossy colors
- 3M ™ Scotchcal ™ Film 220-114 (clear) is enamel paint receptive
- Matte finish available in white, black, red and blue
- Clear, pressure sensitive adhesive

Applications and End Uses

Film series 220 is a custom–formulated, cast vinyl film. It is available exclusively through Gerber Scientific Products and its network of distributors worldwide. This film is intended for making permanent, durable graphics when used with the listed Compatible Products in the following applications. These applications are warranted by the 3M ™ MCS ™ Warranty.

- Prespaced, electronically-cut graphics
- Commercial and industrial applications, including emblems, vehicle graphics, labels, striping, general signage, two way signage
- Graphics applied to flat surfaces with and without rivets, or simple curved surfaces

Limitations of End Uses

We do not normally warrant other applications, but please contact us to discuss your needs or let us suggest other 3M products.

Specifically, we do not warrant this film for the following:

- Application to corrugated surfaces or surfaces with compound curves
- Markings subjected to gasoline vapors or spills
- Backlit signage (use 3M ™ Scotchcal ™ Translucent Film Series 230 instead)
- Thermoforming
- Graphics made for automotive Original Equipment Manufacturers (OEM); contact 3M Automotive Division at 800-328-1684, Ext. 444 for alternatives

Compatible Products

- 3M ™ Panaflex ™ Awning and Sign Facing Series 945 GPS
- 3M ™ Panaflex ™ *Enhanced Image* Sign Facing Series 645EI

Product Line

This information is subject to change. Be sure this is the most current Product Bulletin. See 3M Related Literature at the end of this bulletin.

Property	Description
Film	2 mil, opaque (except 220-114) cast vinyl
Colors	See page 2
Thickness (film and adhesive)	2.5 to 3.5 mil (0.063 to 0.09 mm)
Adhesive	Clear, pressure sensitive
Liner	78 pound white kraft liner
Minimum application temperature	40°F (4°C)
Application surfaces	For flat surfaces with and without rivets, or simple curved surfaces
Application substrates	Flexible signage, glass, metal, acrylic, polycarbonate, fiberglass, painted surfaces
Removability	Permanent

Note: Films with clear adhesive have less hiding power, which should be considered when selecting and preparing a substrate.

Colors

220-10	White	220-77	Peacock Blue	220-253	Warm Red
220-11	Pearl Gray	220-86	Robin Egg Blue	220-263	Perfect Match Red
220-12	Black	220-87	Royal Blue	220-266	Cactus Green
220-13	Tomato Red	220-88	Violet	220-273	Process Magenta
220-14	Bright Orange	220-89	Sandstone	220-276	Bottle Green
220-15	Bright Yellow	220-90	Antique White	220-283	Cranberry
220-17	Vivid Blue	220-94	Coral	220-286	Jade Green
220-19	Deep Mahogany Brown	220-96	Teal	220-293	Atomic Red
220-20	Matte White	220-98	Dark Violet	220-296	Eucalyptus
220-21	Palm Oyster	220-99	Fawn	220-307	Dark Aqua
220-22	Matte Black	220-100	Oyster	220-347	Powder Blue
220-24	Terra Cotta	220-101	Nimbus Gray	220-357	Bermuda Blue
220-25	Sunflower	220-103	Magenta	220-367	Celestial Blue
220-27	Navy	220-104	Dark Coral	220-377	Blue Bird
220-29	Russet Brown	220-105	Imitation Gold	220-387	Periwinkle
220-31	Medium Gray	220-114	Clear Enamel Receptive	220-397	Dark Blue
220-37	**Sapphire Blue**	**220-130**	**Eggshell**	220-407	Matte Blue
220-38	Royal Purple	220-133	Raspberry	220-417	Sky Blue
220-39	Tan	220-134	Intense Orange		
220-41	Dark Gray	220-135	Primrose Yellow	**Metallic Colors**	
220-46	Kelly Green	220-138	Pale Lavender		
220-47	Intense Blue	220-139	Saddle Brown	220-120	Silver
220-48	Purple	220-145	Chrome Yellow	220-131	Gold
220-49	Beige	220-151	Traffic Gray	220-201	Slate
220-53	Cardinal Red	220-163	Dark Magenta	220-206	Pine Green
220-54	Light Orange	220-173	Salmon Pink	220-208	Burgundy
220-56	Dark Green	220-176	Aqua	220-209	Dark Brown
220-57	Olympic Blue	220-177	Shadow Blue	220-211	Charcoal
220-58	Burgundy	220-186	Bright Green	220-216	Sage Green
220-63	Geranium	220-187	Wedgewood Blue	220-217	Dark Blue
220-64	Apricot	220-193	Mauve	220-218	Light Rose
220-66	Forest Green	220-196	Apple Green	220-227	Bright Blue
220-68	Dark Burgundy	220-197	Light Navy	220-229	Copper
220-69	Duranodic	220-223	Matte Red	220-231	Light Gold
				220-237	Silver Blue

Note: For the full product names of the 3M products listed on this page, please see page 1.

Effective Performance Life

The effective performance life for film series 220 is based on field experience and exposure tests conducted throughout the United States. When the graphics are processed and used according to 3M recommendations, they should have the performance life shown in the charts below. The actual performance depends on the following conditions.

- Selection and preparation of the substrate
- Application methods
- Exposure conditions
- Cleaning methods

Warranted Durability

Vertical Exposure		
Scotchcal Film Series 220	**Vertical Exposure** *face of graphic is vertical 90° ± 10°*	
	U.S. [1], [4] *years*	**S.W.** [2], [4] *years*
Signs Only		
Solid colors, except metallic colors and clear		
Unprinted, applied to first surface	7	5
Unprinted, applied to second surface	7	5
Vehicles Only		
Solid colors, except metallic colors and clear		
Unprinted, applied to first surface	8	5
Unprinted, applied to second surface	8	5
Signs and Vehicles		
Metallic colors 220-120, -131, -201, -206, -208, -209, -211, -216, -217, -218, -227, -229, -231, -237 **Clear 220-114**		
Unprinted, applied to first surface	5	3
Unprinted, applied to second surface	5	3

Non-Vertical Exposure		
Scotchcal Film Series 220	**Non-Vertical Exposure[3]** *face of graphic is greater than 10° from vertical*	
Solid colors 220-10, -12, -20, -22 and -11, -13, -14, -15, -53	**U.S.** [1], [4] *years*	**S.W.** [2], [4] *years*
Unprinted, applied to first surface	5	0

[1] For the warranty periods outside the United States, contact Gerber Scientific Products.

[2] The United States Desert Southwest area includes Arizona, New Mexico, and the desert areas of California, Nevada, Utah, and Texas. A detailed map is available by request.

[3] Non-vertical applications can be used to identify commercial vehicles from the air. Non-vertical applications expose the film to the maximum effect from sunlight and the environment. There are ink and film restrictions for horizontal applications. The film may change color, lose gloss, and chalk. The following performance statements assume that only legibility is required.

[4] Unprinted films 220-20, -163, -263, -273, and -286 may chalk with age. This is considered normal and acceptable wear.

Fabrication

This Bulletin does not contain detailed processing or application procedures. Refer to the 3M Related Literature on page 4 section for further information.

Minimum Cutting Heights

Based on cutting and weeding evaluations that used Helvetica medium upper case, the recommended minimum cutting height for text is 0.375 inch (0.95 cm). Because of the differences in electronically-controlled cutting equipment and font characteristics, users should determine their own cutting and weeding capability.

These factors can affect cutting quality and ability:

- **Sharpness of the knife blade.** Dull blades create a serrated look to the cut edge of the film.
- **Weight on the knife blade.** The ideal weight slightly scores the liner. Too little weight does not cut completely through the film and the adhesive. Excessive weight cuts the liner. It also causes the blade to drag, accelerating wear and eventually creating a serrated cut edge on the film.
- Temperature and relative humidity are minor considerations, but avoid extreme or rapidly fluctuating conditions.
- Store the film in the same environment as the cutting equipment.
- Consider the stroke width of characters, style of serifs or extensions, and small details of scanned or digitized artwork.
- The minimum recommended stroke width is 0.040 inch (1.0 mm) when film is exposed to cleaning or other physical stress.

Printing

Film series 220 is designed for use with the Gerber Digital Imaging systems and is compatible with GerberColor™: GCP (Process); GCS (Spot); GCT (Transparent); GCM (Medal); GCX (Special Effects); and GCF (Finishing) Series Foils.

Application Tape

The application tape to use depends on the type of graphic produced. See Instruction Bulletin 4.3 for details.

- For graphics that have a large amount of exposed liner, and/or small letters and/or narrow stroke width, use 3M™ Prespacing Tape SCPS-2.

- For graphics that have very little exposed liner, and/or large letters, and/or wide stroke width, use 3M™ Premasking Tape SCPM-3.

Shelf Life, Storage, and Shipping

Follow these guidelines to store and ship film series 220 and the processed graphics.

- Unprocessed film has a shelf life of 2 years after receipt from 3M. Processed film has a shelf life of 1 year. However, the total shelf life of a graphic before and after processing cannot exceed 2 years.

- Store the film in a clean, dry area, out of the direct sunlight, and at less than 100°F (38°C).

- Ship the finished graphic lying flat or in a roll. To roll the graphic, wrap it film-side out onto a core that is 5 inches (13 cm) or larger in diameter. These methods prevent the liner from wrinkling or graphics from popping off.

Product Data

The values given are typical for film series 220 and are not for use in specifications. The data given below are for film as purchased from 3M.

Physical Properties

Property	English Units	Metric Units
Tensile strength (minimum)	5 pound/inch at 73°F	0.9 kg/cm at 23°C
Applied shrinkage	0.008 inch	0.2 mm
Service temperature range	-40° to +225°F	-40° to +107°C
Reverse impact resistance	No cracking at 73°F or 40°F	No cracking at 23°C or 4°C

Adhesive Characteristics
(24 hours after application)

Material	English Units pounds/inch	Metric Units kg/cm
Acrylic	4	0.7
Acrylic enamel	4	0.7
Alodine aluminum	8	1.4
Chrome plating	5	0.9
Fruehauf prepainted panels	4	0.7
Polycarbonate	4	0.7
Urethane paints	4	0.7

Chemical Resistance Characteristics

- Resists mild acids, alkalis, and salts
- Excellent water resistance

Flammability

Film 220-10 has been tested for flame spread per ASTM E84-95, "Surface Burning Characteristics of Building Materials," and meets the requirements of National Fire Protection Association Class A (1) (most fire-resistant class) as defined in NFPA 101, "Life Safety Code."

Health and Safety

> ⚠ **Caution**
>
> When handling any chemical products, read the manufacturers' container labels and the Material Safety Data Sheets (MSDS) for important health, safety and environmental information.
>
> To obtain MSDS sheets for 3M products:
> - By fax, call 1-800-364-0768 in the US and Canada or 1-650-556-8417 for all other locations.
>
> - Electronically, visit us at http://www.3M.com, then select MSDS search.
>
> - By mail, or in case of an emergency, call 1-800-364-3577 or 1-651-737-6501.
>
> When using any equipment, always follow the manufacturers' instructions for safe operation.

Warranty and Limited Remedy

*The following is made in lieu of all other express or implied warranties, including any implied warranty of **merchantability** or fitness for a particular purpose:* Film series 220 is warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this Product Bulletin. 3M will replace or refund the price of any 3M materials that do not meet this warranty within the specified time periods. See the worldwide 3M™ MCS™ Warranty bulletin, which gives the terms and limitations of the warranty.

These remedies are exclusive. In no case shall 3M be liable for any direct, indirect, or consequential damages, including any labor or non-3M materials charges.

3M Related Literature

Listed below is related 3M technical literature that may be of interest. You may view and print these Bulletins from our website at www.scotchprintgraphics.com, or order them via our Fax-on-Demand (FOD) system. Call one of these phone numbers to order the desired bulletins, and specify the FOD document number provided in the chart.

United States or Canada: 1-800-364-0768
International: 1-651–732–6506

Subject	Bulletin No.	FOD No.
Product Bulletins		
3M™ Panaflex™ *Enhanced Image* Sign Facing 645EI	645	4001
3M™ Panaflex™ Awning and Sign Facing 945 GPS	945	4006
3M™ Scotchcal™ Translucent Film Series 230	230	3002
Instruction Bulletins		
Design of graphics	2.1	5501
Using 3M application tapes;premasking and prespacing for films and sheetings	4.3	6503
Application, substrate selection, preparation and substrate-specific application	5.1	7001
Application, general procedures for interior and exterior dry applications	5.5	7005
Storage, handling, maintenance, removal	6.5	8505
Warranties		
Worldwide 3M™ MCS™ Warranty Packet *(includes all Commercial Graphics MCS Warranties)*		9503
Worldwide 3M™ MCS™ Warranty Overview-Folder		9504
3M™ MCS™ Graphics Warranty for Panaflex Awning and Sign Facings *(includes overview)*		9507

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