

List of Acceptable Plastics for Optical Lenses and Reflex Reflectors Used on Motor Vehicles

April 4, 2025



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April 4, 2025 Edition

Automotive Manufacturers Equipment Compliance Agency, Inc. 1025 Connecticut Avenue, NW Suite #1000 Washington DC 20036

<u>www.ameca.org</u>

1. STATUS

The following materials have been accepted by the Automotive Manufacturers Equipment Compliance Agency as meeting the 3-year weathering test of FMVSS 108 for plastics used in optical lenses and reflectors used on motor vehicles. No evaluation has been made as to the suitability of individual materials for particular automotive uses, or to the manufacturing methods.

You must contact the resin or coating manufacturer to determine the best material for your application.

Every plastics resin manufacturer has specialized products for different applications, processing conditions, manufacturing equipment, light sources and final use.

Please contact the manufacturer directly for more information.

The device manufacturers must ensure that the lenses molded from acceptable materials meet the color and plastic stability test requirements for each individual device.

2. LISTING

The material is listed by the manufacturer's name, trade name and flow formulation, type of resin, color number and color.

3. MATERIAL COATINGS AND HAZE

When these materials are used for state/provincial regulated lighting device lenses, the applicable state/provincial regulations shall be met.

The Code "#" denotes material which must be coated to pass the 7% haze requirement. This material does **not** need to be coated to meet the 30% haze requirement.

The Code "Q" denotes a coated material that must be coated to pass the 7% haze requirement. **No** *information is given on uncoated performance.*

The Code "Q2" denotes a coated material that must be coated to pass the 7% haze requirement. This material **can not be used** uncoated.

The Code "\$" denotes a coated material with haze values between 7% and 30%. **No information is given on uncoated performance. These cannot be used as or in front of a reflex reflector.**

The Code "@" denotes a coated material with haze values between 7% and 30%. This material **cannot be used** when uncoated. **These cannot be used as or in front of a reflex reflector.**

The Code "!" denotes a material that does not require a coating to be used as an inner lens when protected by an outer lens designated by Code "#". The inner and outer lens materials have been tested <u>together</u> as a <u>system</u> and together they will meet FMVSS 108.

Only materials tested together, may be used this way. <u>Not every manufacturers materials will qualify for the outer lens</u>. **Other manufacturers lens material may NOT be used as an outer lens** even if those materials are designated #. The inner and outer lens must be tested <u>together.</u>

4. DISTRIBUTION

This list is updated and distributed free on a monthly basis. Any revised or pre-release editions may be obtained by contacting AMECA.

5. **DEFINITIONS**

Coating -- Material applied to surface of the lens to improve some aspect of performance.

Coated materials-- a material which has a coating applied to the surface of the finished sample to impart some protective properties. Coating identification means a mark of the manufacturer's name, formulation designation number, and recommendations for application.

Color bleeding -- the migration of color out of a plastic part onto the surrounding surface.

Cracking -- a separation of adjacent sections of a plastic material with penetration into the specimen.

Crazing -- a network of apparent fine cracks on or beneath the surface of materials.

Delamination -- a separation of the layers of a material including coatings.

Hard Coat -- 1) Coating which is cured by UV radiation.

2) Coating which provides additional resistance to abrasion or scratching which may be cured by thermally or by UV radiation. May contribute to long term durability of material.

Note: Both definitions are being used--please verify the intended performance when discussing hard coats.

Haze -- the cloudy or turbid appearance of an otherwise transparent specimen caused by light scattered from within the specimen or from its surface.

Inner Lens—A material covered by another material for testing. It is used interchangeably with "protected application"

Protected Application. A material covered by another material for testing. It is used interchangeably with Inner Lens.

Reflex reflectors-- devices used on vehicles to give an indication to approaching drivers using reflected light from the lamps of the approaching vehicle.

Substrate -- Base material to which all other performance enhancing materials are added.

UV-protective Coat -- Coating designed to provide additional protection from the sun's electromagnetic radiation, particularly those wavelengths in the UV bandwidth. Often used on polycarbonate substrates to improve weathering performance. Polycarbonates must be coated for use in or in front of reflex reflectors.

UV radiation -- Short wavelength, high energy radiation emitted by the sun or other object (HID lamp). Wave lengths between 10 and 380 nm.

HID Lamp -- High Intensity Discharge Lamp. Lamps produce light by the use of a stabilized arc. Lamps can produce significant UV radiation which may require special materials. See SAE J-1647

6. NOTE ON COLOR

The colors listed have been determined to be in compliance with SAE J-578 using the ASTM E 308-66 method required by FMVSS 108 or in thicknesses specified by the resin manufacturer.

NOT EVERY COLOR LISTED WILL MEET SAE J-578 COORDINATES FOR YOUR <u>INTENDED</u> THICKNESS

NOT EVERY MATERIAL IN EVERY COLOR WILL MEET J578 WITH LED OR ILLUMINANT C LIGHTSOURCES

CHECK WITH THE RESIN MANUFACTURER'S COLOR SPECIALIST

The ASTM E 308-66 method uses an illuminant A light source energized to 2856k. If you use anything other than an incandescent light source at 2856k you MUST verify that the resulting color meets the specifications of SAE J-578 for your intended thickness. Halogen light sources at 3200k, illuminant C (strobe) and LED light sources will dramatically alter the color output. In addition, some light sources do not emit color or luminous flux uniformly. Measurements should be made to verify that the emitted light using your intended lightsource meets the specifications of J-578 throughout its photometric range.

7. NOTE ON INNER LENS COLOR

Combinations of inner and outer lenses with various colors may not perform predictably. Output will vary markedly with different light sources. Check with the resin manufacturer's color specialist when making selections

8. NOTE ON "EQUIVALENT" FORMULATIONS.

Many companies have distributed manufacturing facilities, cooperative agreements or joint ventures. In order to list a facility or another company the company which has done the three year weathering testing must send documentation stating that the materials, processes and end products are equivalent between itself and the new applicant. Due to industry complaints, the List of Acceptable Plastics has revised the listing to more accurately reflect the test data from various parent companies. In addition, if the joint venture is terminated or the manufacturing facility is sold, the subsidiary or joint company must be able to provide weathering test data on its own. A company can no longer rely on the parent company data and processes if they have no relationship to the parent company who conducted the original testing.

10. NOTE ON SUBMITTING FOR ADDITIONAL COLORS

If you plan to add an additional color number to your listing, please list the existing colors which have undergone the three year weathering that are a greater and lesser concentration. The colors listed MUST be in the same color space. See FMVSS 108 S14.4.2.1.3

11. Note on Inner Lens and Inner Coating Testing

Only inner and outer lens materials, tested together, may be registered for an inner lens system. Not every manufacturer's materials will qualify for the outer lens. Other manufacturers lens material may NOT be used as an outer lens even if those materials have successfully been used as an outer lens for a different material. The inner lens/coating and outer lens/coating must be tested <u>together as a system</u>.

Currently the DOT has issued no guidelines for inner lenses. If and when they do, they will be the requirements that everyone must follow. In the meantime, we would recommend for following guidelines for inner lens test setup.

- 1) You must bracket test every color combination (light/dark) you want to use—red, blue, amber, etc. The light/dark colors must be in the same color space.
- 2) You must bracket test molecular weight (heavy/light) for both outer lens and inner lens.

- 3) The test setup—airspace, ventilation, should duplicate as close as possible the conditions in an inner automotive lens including factors such as ventilation, spacing between inner and outer lens and coatings.
- 4) For more information, please see SAE Paper: http://papers.sae.org/2004-01-0800

Inner lens materils will be listed with their outer lens material jointly as a system. Both the inner lens and outer lens material/color will be listed with both materials specified. If you only test a limited range of lens colors, thicknesses or materials that is how they will be listed.

12. Special Note on the definition of "Protected Inner Lens" and/or "Protected Applications"

Protected Inner Lenses or Protected Applications for polycarbonate lenses refers to an outer lens which has a UV absorbing capabilities. NOT physical protection but UV protection.

Frequently Asked Questions

- Q1) If someone else has weathered a polycarbonate/PMMA material, do I have to weather my polycarbonate/PMMA material?
- A) Yes, every company's material stands independently from what another company has done. Each coating, pigment and additive must be tested with each company's own material. Each separate material stands alone for weathering performance unless bracketed by materials of higher and lower concentrations or molecular weights.
- Q2) If someone else has weathered a pigment with another plastic do I have to weather the pigment with my plastic?
- A) Yes, every company's material stands independently from what another company has done. Each coating, pigment and additive must be tested with each company's own material. Each separate material stands alone for weathering performance unless bracketed by materials of higher and lower concentrations or molecular weights.
- Q3) If someone else has weathered a coating do I have to weather my material with that coating?
- A) Yes, every company's material stands independently from what another company has done. Each coating, pigment and additive must be tested with each company's own material. Each separate material stands alone for weathering performance unless bracketed by materials of higher and lower concentrations or molecular weights.
- Q4) Testing laboratories typically use a 1-10 numbering scale according to ASTM D660 to indicate the degree of crazing, cracking or delamination associated with weathering. What numerical value from ASTM D660 is acceptable for listing?
- A) FMVSS 108 does not refer to any numerical values from ASTM D660. The numerical values are done by the test laboratory for manufacture convenience.

FMVSS 108 states:

S14.4.2.2.4.2 After completion of the outdoor exposure test materials used for headlamp lenses must show no deterioration.

S14.4.2.2.4.3 After completion of the outdoor exposure test all materials, when compared with the unexposed control samples, must not show physical changes affecting performance such as color bleeding, delamination, crazing, or cracking. <u>Additionally materials used for reflex reflectors and lenses used in front of reflex reflectors must not show surface deterioration or dimensional changes.</u>

Your tested samples must not show any changes affecting performance. The only value which shows no change is a numerical value of 10.

- Q5) How many thicknesses to I have to test?
- A) FMVSS 108: S14.4.2.1.3 Samples must be furnished in thicknesses of 1.6 ± 0.25 mm, 2.3 ±

- 0.25 mm, $3.2 \pm 0.25 \text{ mm}$, and $6.4 \pm 0.25 \text{ mm}$.
- Q6) Even if it's for a coating? A) Yes.
- Q7) Do materials have to meet the color requirements before testing?
- A) Yes: S14.4.2.1.4 All samples must conform to the applicable color test requirement of this standard prior to testing.
- Q8) What about the plastics used in non-FMVSS applications such as emergency vehicle lighting which also require three year weathering?
- A) Yes, those can be listed with non-standard colors as long as they are NOT used on FMVSS 108 lighting devices.

Testing outline. Note, we also recommend you send DOUBLE samples to prevent any errors.

▶ 4 Thicknesses

For each colour

For each coating

For each molecular weight (MW)

- ► For example for each resin type:
 - 4 thickness samples of dark red, uncoated, Lowest MW Resin A
 - 4 thickness samples of light red, uncoated, Lowest MW Resin A
 - 4 thickness samples of dark red, uncoated, Highest MW Resin A
 - 4 thickness samples of light red, uncoated, Highest MW Resin A
 - 4 thickness samples of dark red, coating 1, Lowest MW Resin A
 - 4 thickness samples of light red, coating 1, Lowest MW Resin A
 - 4 thickness samples of dark red, coating 1, Highest MW Resin A
 - 4 thickness samples of light red, coating 1, Highest MW Resin A

Each resin stands on it's own. Combinations of additives cannot be reliably predicted, especially if they are supposed to control the same issue. (such as two different UV absorbers)

- 4 thickness samples of dark red, uncoated, Lowest MW Resin B
- 4 thickness samples of light red, uncoated, Lowest MW Resin B
- 4 thickness samples of dark red, uncoated, Highest MW Resin B
- 4 thickness samples of light red, uncoated, Highest MW Resin B
- 4 thickness samples of dark red, coating 1, Lowest MW Resin B
- 4 thickness samples of light red, coating 1, Lowest MW Resin B
- 4 thickness samples of dark red, coating 1, Highest MW Resin B
- 4 thickness samples of light red, coating 1, Highest MW Resin B

Now repeat for clear, yellow, blue, coating 2 & coating 3

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MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Asahi Kasei	Delmore H-350A	Polymethacrylic	99141	Clear
Corporation	Anhydride Acrylic	,	D33144	Red
<u>www.asahi-kasei.co</u>	<u>.jp.</u>		D23084	Yellow
Asahi Kasei	Delpet 70H	Polymethyl	99141	Clear
Corporation	Delpet 70N	Methacrylate	99142	Clear
	Delpet 80CT		99143	Clear
	Delpet 80N		LM60302	Clear
<u>www.asahi-kasei.co</u>			NS00165 ¹	Clear
	Delpet 80NE		NS00178 ²	Clear
	Delpet 80NEK		31140	Red
	Delpet 80NEN		31141	Red
	Delpet 80NET		31142	Red
	Delpet 80NF		31143	Red
	Delpet 80NP		31144	Red
	Delpet 80NR		31145	Red
	Delpet 80NS		31151	Red
	Delpet 800F		31152 31153	Red
	Delpet 80EB Delpet 80EH		33140	Red Red
	Delpet 80NH		33141	Red
	Delpet 80TJ		33142	Red
	Delpet PM130N		33143	Red
	Delpet SK420N		33144	Red
	Delpet SK430N		33151	Red
	20,000000000000000000000000000000000000		33153	Red
			33170	Red
			33232	Red
			33233	Red
			33261	Red
			33340	Red
			33402	Red
			K3140 ³	Red
			K3151	Red
			K3232 ³	Red
			21102	Yellow
			21104	Yellow
			21106	Yellow
			21107	Yellow
			21108	Yellow
			21109 21110	Yellow Yellow
1 Note: NS00165 is	listed with Delpet 80N for 1.6	-3.2 mm Only	21110	Yellow
1 14016. 14000 100 18	nated with Delpet outs for 1.0	-5.2 IIIIII Olliy	21207	Yellow
2 Note: NS00178 is	listed with Delpet 80N for 1.6	-2.3 mm Only	21301	Yellow
2 14010. 14000 170 13	noted with Delpet bolk for 1.0	2.5 min Omy	21511	Yellow
3 Note: K3140 and	K3232 are listed for 6.4 mm o	only	21802	Yellow
		···· <i>y</i>	21803	Yellow
			21834	Yellow

т	RADE NAME AND			
	LOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Asahi Kasei	Delpet 70H	Polymethyl	23080	Yellow
Corporation	Delpet 70N	Methacrylate	23082	Yellow
•	Delpet 80N	•	23083	Yellow
www.asahi-kasei.co.jp.			23084	Yellow
	Delpet 80NE		23090	Yellow
	Delpet 80NEK		23091	Yellow
	Delpet 80NEN		23100	Yellow
	Delpet 80NET		23102	Yellow
	Delpet 80NF		23103	Yellow
	Delpet 80NP		23501	Yellow
	Delpet 80NR		23502	Yellow
	Delpet 80NS		23503	Yellow
	Delpet 800F		23505	Yellow
	Delpet 80EB		23506	Yellow
	Delpet 80EH		23507	Yellow
	Delpet 80NH		9814	Gray
	Delpet 80TJ		9834	Gray
	Delpet PM130N		9870	Gray
	Delpet SK420N		90810	Gray
	Delpet SK430N		90811 90812	Gray
			90813	Gray
			90814	Gray Gray
			90816	Gray
			90817	Gray
			90818	Gray
			90821	Gray
			90823	Gray
			90825	Gray
			90827	Gray
			90828	Gray
			90832	Gray
			90834	Gray
			90836	Gray
			90837	Gray
			90838	Gray
			90841	Gray
			90844	Gray
			90848	Gray
			90853	Gray
			90854	Gray
			90861	Gray
			90866	Gray
			90870	Gray
			90875	Gray
			90876	Gray
			90878	Gray
			90879	Gray
			90881 90882	Gray
			90882	Gray
			90884	Gray Gray
			90885	Gray
			90886	Gray
			90888	Gray
			90889	Gray
			90899	Gray
			50033	Citay

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Asahi Kasei Corporation .www.asahi-kase	Delpet SR i.co.jp.	Polymethyl Methacrylate	99141 33151 23100 90810 90817 90817	Clear Red Yellow Gray Gray Gray
Asahi Kasei Corporation www.asahi-kas	Stylac-AS XT-751 sei.co.jp	Styrene/ Acrylonitrile Copolymer	SR 40501	Yellow
Asahi Kasei Corporation www.asahi-kase	Stylac-AS XT-753 i.co.jp	Styrene/SR Acrylonitrile Copolymer	40113 SR 40417 SR 40418 SR 40422 SR 40429 SR 40524 SR 40525 SR 40531 SR 40536 SR 40539	Clear Red Red Red Yellow Yellow Yellow Yellow Yellow

TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Chimei Corporation ACRYREX CM-205	Polymethyl	N-000	Clear
Methacrylate		R-001	Red
www.chimeicorp.com.tw		R-002	Red
		R-003	Red
		R-004	Red
		R-103	Red
		R-104	Red
		A-001	Yellow
		A-202	Yellow
Note: R-002 Red is only listed in 6.3 mm (1/4") th Note: R-003 Red is only listed in 2.3mm to 6.3 mm	m (0.09" to .25") thickness	A-203 S-001	Yellow Smoke
Chimei Corporation ACRYREX CM-205M	Polymethyl	N-000	Clear
www.chimeicorp.com.tw	Methacrylate	R-001	Red
www.orininoloorp.com.tw	Wethdorylate	R-002	Red
		R-003	Red
		R-004	Red
		R-103	Red
		R-104	Red
		A-001	Amber
		A-202	Amber
		A-203	Amber
		P-001	Clear/Pink
Note A-202 is only listed in 1.6-3.2mm thickness.		S-001	Smoke
Chimei Corporation WONDERLITE PC-110L	Polycarbonate	N-102	Clear \$
·	•	N-102H	Clear \$
www.chimeicorp.com.tw		N-102K	Clear \$
		N-102U	Clear \$
		N-103	Clear \$
		N-103H	Clear \$
		N-103K	Clear \$
		N-103U	Clear \$
		N-104	Clear \$
		N-104H	Clear \$
		N-104K	Clear \$
		N-104U	Clear \$

Coated Chimei Corporation plastics may only be used when treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking K-101: See Mitsubishi Chemical Corporation

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7, FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3: See Fujikura Kasei Co., Ltd.

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, and UVHC3000KZ60: See Performance Materials Inc.

Coating Manufacturer in Alphabetical Order



Information on FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7, FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-3, coating may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp



Information on Mitsubishi Chemical Corporation Acryking K-101 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp



Information on UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, and UVHC3000KZ60 hard coat may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	<u>NUMBER</u>	COLOR
Chimei Co	rporation WONDERLITE PC-115L	Polycarbonate	N-15P01 N-15P801	Clear \$ Clear \$

www.chimeicorp.com.tw

Note: N-15P01 is listed is only listed in 6.4mm thickness. Note: N-15P01 was only tested with Acryking PH-720. Note: N-15P801 was only tested with Acryking PH-800.

Coated Chimei Corporation plastics may only be used when treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking PH-720; PH-800: See Mitsubishi Chemical Corporation

Coating Manufacturer in Alphabetical Order



Information on Mitsubishi Chemical Corporation Acryking PH-720; PH-800 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Chimei Corpora Zhenjiang Chin	ation ACRYREX CM-205	Polymethyl Methacrylate	N-000 R-001	Clear Red
Znonjiang omi		Wethatylate	R-002	Red
www.chimeicor	rp.com.tw		R-003	Red
	·		R-004	Red
			R-103	Red
			R-104	Red
			A-001 A-202	Yellow Yellow
Note: P 002 Pa	ed is only listed in 6.3 mm (1/4") th	ickness	A-202 A-203	Yellow
	ed is only listed in 2.3mm to 6.3 m		S-001	Smoke
Chimei Corpora	ation ACRYREX CM-205M	Polymethyl	N-000	Clear
Zhenjiang Chin		Methacrylate	R-001	Red
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	R-002	Red	
www.chimeicorp.com.tw		R-003	Red	
	<u></u>		R-004	Red
			R-103	Red
			R-104	Red
			A-001	Amber
			A-202	Amber
			A-203	Amber
			P-001	Clear/Pink
Note A 202 is	only listed in 1.6-3.2mm thickness		S-001	Smoke
Mole A-202 IS	only listed in 1.0-3.2mm thickness	i.	3-001	Smoke
Chimei Corpora	ation WONDERLITE PC-110L	Polycarbonate	N-102	Clear \$
Zhenjiang Chin	าล	•	N-102H	Clear \$
			N-102K	Clear \$
www.chimeicor	rp.com.tw		N-102U	Clear \$
			N-103 N-103H	Clear \$ Clear \$
			N-103H N-103K	Clear \$
			N-103U	Clear \$
			N-104	Clear \$
			N-104H	Clear \$
			N-104K	Clear \$
			N-104U	Clear \$

Coated Chimei Corporation Zhenjiang China plastics may only be used when treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking K-101: See Mitsubishi Chemical Corporation

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7, FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3: See Fujikura Kasei Co., Ltd.

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, and UVHC3000KZ60: See Performance Materials Inc.

Coating Manufacturer in Alphabetical Order



Information on FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7, FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3, coating may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp



Information on Mitsubishi Chemical Corporation Acryking K-101 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome 1-2 Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp



Information on UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, and UVHC3000KZ60 hard coat may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Chimei Corpo	ration WONDERLITE PC-115L	Polycarbonate	N-15P01	Clear \$
Zhenjiang Chi	na		N-15P801	Clear \$

www.chimeicorp.com.tw

Note: N-15P01 is listed is only listed in 6.4mm thickness. Note: N-15P01 was only tested with Acryking PH-720. Note: N-15P801 was only tested with Acryking PH-800.

Coated Chimei Corporation plastics may only be used when treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking PH-720; PH-800: See Mitsubishi Chemical Corporation

Coating Manufacturer in Alphabetical Order



Information on Mitsubishi Chemical Corporation Acryking PH-720; PH-800 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp



Covestro Deutschland AG (Europe)
Covestro LLC (America)
Covestro (Hong Kong) Limited (Asia Pacific)
www.covestro.com

Apec® 1603	High-Heat	550042	Clear Q!
Apec® 1703	Polycarbonate	551022	Clear Q!
Apec® 1803	•	550674	Clear Q!
Apec® 1895	(Protected Applications Only)	250337	Yellow Q!
Apec® 1897	77	250322	Yellow Q!
Apec® 2097		250339	Yellow Q!
(coated)		250196	Yellow Q!
,		256866	Yellow Q!
		256894	Yellow Q!
		350056	Red Q!
		350335	Red Q!
		350340	Red Q!

Note: 250337 is for Apec® 1803 only

Coated Covestro Deutschland AG (Europe), Covestro LLC (America) and Covestro (Hong Kong) Limited (Asia Pacific) Apec plastics may only be treated with the following coatings listed below when applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, Acryking PH-220, Acryking PH-328. Acryking PH-730, Acryking PH-740 and Acryking PH-750: See Mitsubishi Chemical Corporation

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

MODIHARD 200S: See NOF Corporation

PHC 587C, PHC 587C2: See Momentive Performance Materials Inc.

Stanley SH-41: See Stanley Electric

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60: Momentive Performance Materials Inc.

UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2: Momentive Performance Materials Inc

UVHC8100: Momentive Performance Materials Inc

UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7 and UVT610V8: See Red Spot

Coating Manufacturer in Alphabetical Order

TYPE OF RESIN



MFR.

MITSUBISHI Information on Acryking F-328, Acryking K-101, Acryking PH-220, Acryking PH-328, Acryking PH-730, Acryking PH-740 and Acryking PH-750 coatings may be obtained by writing to the following address:

> Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking K-101 is NOT suitable for use with or in front of a reflex reflector

Note: Acryking PH-328, Acryking PH-730, Acryking PH-740 and Acryking PH-750 coatings are only suitable

for clear Apec® 1803, Apec® 1897 and Apec® 2097



Information on FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3 coatings may be obtained by writing:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo, 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH2551U series is only suitable for use on Apec® 1803 and Apec® 1897

Note: FUJIHARD HH2551U series data was submitted by Fujikura Kasei



Information on PHC 587C, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1, UVHC3000K-Z, UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2, and UVHC8100 hard coat may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany

Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC3000 was tested on Apec 1603

Note: UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60 only Apec® 1703

and Apec® 1803

Note: PHC 587C, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1, UVHC3000K-Z, UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2, and UVHC8100 test data was submitted by Momentive Performance Materials Inc.

Note: UVHC5000 was tested on clear Apec® 1603 and 1803 only.

Note: UVHC8100 was tested on clear Apec® 1603, Apec® 1697 Apec® 1803 and Apec® 1897 only.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome, Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: All MODIHARD 200S data was submitted by NOF Corporation

Note: MODIHARD 200S is acceptable on AL2447 Clear in thicknesses 2.3-6.4 mm only



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7 and UVT610V8 coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: UVT200 tested on clear samples only.

Note: UVT610V tested on clear Apec® 1603 and 1803

Note: All UVT test data submitted by Red Spot.

Information on SH-41 hard coat may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku Meguro-Ku, Tokyo 153, Japan www.stanley.co.jp

Note: Stanley SH-41 is only acceptable for use on Apec 1803



Covestro Deutschland AG (Europe)
Covestro LLC (America)
Covestro (Hong Kong) Limited (Asia Pacific)
www.covestro.com

Makrolon® 2407	Polycarbonate	550012	Clear#
(UVT610V2 Coating Only)	,	550115	Clear#
Makrolon® 2407		550207	Clear#
Makrolon® 2607		550396	Clear#
Makrolon® 2807		550660	Clear#
Makrolon® 3107 (only availab	e in color 550115 Clear)	551070	Clear#
Makrolon® AG2477	,	350231	Red#
Makrolon® AG2477 RE		350232	Red#
Makrolon® AG2477 RP(XX) C	Q	350391	Red#
Makrolon® AG2677		350392	Red#
Makrolon® AG2677 RE		350393	Red#
Makrolon® AG2677 RP(XX) C	Q	357866	Red#
Makrolon® AL2447		357868	Red#
Makrolon® AL2447 MAS181		250200	Yellow #
Makrolon® AL2447 MAS402(0	Coated only)	250337	Yellow #
Makrolon® AL2447 RE		250210	Yellow #
Makrolon® AL2447 RP(XX) C	Ω	250392	Yellow #
Makrolon® AL2447 XT		250393	Yellow #
Makrolon® AL2647		256811	Yellow #
Makrolon® AL2647 MAS402(0	Coated only)	256866	Yellow #
Makrolon® AL2647 RE		256894	Yellow #
Makrolon® AL2647 RP(XX) C	Ω	256896	Yellow #
		256908	Yellow#
		558920	Blue #
		558889	Blue #
		751303	Gray#
		750142	Gray#
		752969	Gray#
Note: Color 250337 is available on AL2647 only		752970	Gray#
Note: Colors 750142 and 770016 are available in	•	770016	Gray#
Note: The resin designation (XX) can be part of the the specific attributed chemically recycled share for		778002	Gray#

LED Product Grades
Protected Applications Only

Makrolon® LED2045	Polycarbonate	000000	Clear
Makrolon® LED2245		550128	Clear
Makrolon® LED2245 RE		550207	Clear
Makrolon® LED2245HP		551592	Clear
Makrolon® LED2245HP RE		551467	Clear
Makrolon® LED2247		551056	Clear

Note: All Covestro inner lens products are tested behind clear coated 2.3 mm Makrolon AL 2647

Note: Makrolon® LED2245HP and LED2245HP RE are available in color 000000 only



Covestro Deutschland AG (Europe) Covestro LLC (America) Covestro (Hong Kong) Limited (Asia Pacific) www.covestro.com

Edge-Lighting Product Grades Protected Applications Only

Makrolon® LED2245EL Polycarbonate 021754 White 021760 White 021767 White 021769 White

Note: Makrolon® LED2245EL may not be used as a reflex reflector.

Makrolon® LED2245EL is considered a diffused material above 3.2 mm when behind PMMA, and above

6.4 mm when behind polycarbonate.

Coated Covestro Deutschland AG (Europe), Covestro LLC (America) and Covestro (Hong Kong) Limited(Asia Pacific) Makrolon AL plasics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328 hardcoat: see Mitsubishi Chemical Corporation

Acryking K-101, Acryking K-103 hardcoats: see Mitsubishi Chemical Corporation

Acryking PH-220, Acryking PH-328, Acryking PH-503, Acryking PH-511, Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-730, Acryking PH-740, Acryking PH-750 Acryking PH-800, Acryking PH-800N5A And Acryking PH-930 hardcoats: see Mitsubishi Chemical Corporation

CD-3M12: See HIPRO Polymerials (Jiangsu) Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

KUV-1000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100: See KCC Corporation

LHP100/LHC100: See Momentive Performance Materials, Inc.

MFR.

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd

PH503, PH-511, PH-730, PH-740 and PH-750: See Mitsubishi Chemical Corporation

PHC587, PHC 587C, PHC 587C2: See Momentive Performance Materials, Inc.

PHOLUCID No. 115C, PHOLUCID No. 130C and PHOLUCID No. 180C: See Chugoku Marine Paints

RayGloss 400, RayGloss 401, RayGloss 402: See BASF Coatings GmbH

SH-41, SH-50, SH-51, and SH-61 hard coats: See Stanley Electric

SHP300/SHC3000, SHP401/AS4000, SHP401/SHC4002, SHP470FT/AS4700, SHP470FT2050/AS4700: See Momentive Performance Materials Inc

UVHC3000C, UVHC3000CS, UVHC3000K, UVHC3000K1, UVHC3000K1, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60: See Momentive Performance Materials Inc

UVHC5000K, UVHC5000K1, and UVHC5000K2 hard coats: See Momentive Performance Materials Inc.

UVHC8100: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3, UVT200V5 coatings: See Red Spot

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8 coatings: See Red Spot

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

X-48-5500-A18: See Shin-Etsu Chemical Co., Ltd.

Coating Manufacturer in Alphabetical Order



Information on RayGloss 400, RayGloss 401, and RayGloss 402 coatings may be obtained by writing:

BASF Coatings GmbH ECO/DT - C422 D-48165 Muenster Germany www.basf-coatings.com

Note: BASF RayGloss 400, 401 and 402 were tested on 2447 and 2647 clear only.

Note: All Raygloss data submitted by BASF

(Coating manufacturer information starts on next page.)



Information on PHOLUCID No. 115C and PHOLUCID No. 130C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan Telephone: 81-3-3506-3971

Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: All PHOLUCID test data submitted by Chugoku Marine Paints.

Note: PHOLUCID No. 115C and PHOLUCID No. 130C were tested on clear Makrolon AL2447 and AL2647.

Note: PHOLUCID No. 180C was tested on Makrolon AL2447 and AL 2647 clear.

Information on KUV-1000, KUV-3000, KUV-4000, KUV-5000, KUV-6000 coatings may be obtained by writing:



KCC Corporation 83 Mabook-Dong, Giheung-Gu Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Note: KUV-1000 was tested on 6.4mm lens thickness only

Information on KUV-1000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100 was submitted by KCC Corporation

KUV-4000, KUV-5000, KUV-6000 tested on AL2447 and AL2647 clear only. KUV-3000 and KUV-9100 were tested on Makrolon® AL2447 clear only.



Information on FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U coatings may be obtained by writing:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo, 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH2540U-series, FUJIHARD HH2551U-series, FUJIHARD HH2561U-series, FUJIHARD HH2570U-series, FUJIHARD HH3372U, FUJIHARD HH3401U, and FUJIHARD HH3482U were tested on clear Makrolon® AL2447 and Makrolon® 2647

Note: FUJIHARD HH2541U-series, FUJIHARD HH2551U-series, FUJIHARD HH2561U-series, FUJIHARD HH2570U-series, HH3372U and FUJIHARD HH3482U data was submitted by Fujikura Kasei

TRADE NAME AND **FLOW FORMULATION**

TYPE OF RESIN

NUMBER

COLOR



Information on CD-3M12 coating may be obtained by writing to the following address:

HIPRO Polymer Materials (Jiangsu) Co., Ltd. North Industrial Park Wuxi, Jiangsu P.R. China

Tel.: +86-510-87855326

Website: www.hiprocoating.com

Note: HIPRO CD-3M12 is NOT suitable for use with or in front of a reflex reflector

Note: HIPRO CD-3M12 only complies with FMVSS 108 in 1.6 mm through 3.2 mm thicknesses.

Note: HIPRO CD-3M12 was only tested on Makrolon 2647 Clear.



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd.

2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153

Japan

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: All data on NIPPE UVI Coat UT-1678 coating was submitted by Nippon Paint Automotive Coatings.

Note: NIPPE UVI Coat UT-1678 was tested on Makrolon AL2447 and AL2647 clear.



Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking K-101, Acryking K-103, Acryking PH-220, Acryking PH-328, Acryking PH-503, Acryking PH-511, Acryking PH-700 Acryking PH-710, Acryking PH-720, Acryking PH-730, Acryking PH-740, Acryking PH-750, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 hardcoats may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 Japan

www.m-chemical.co.jp

Note: All data submitted by Mitsubishi Chemical Corporation

Note: Acryking PH-710, Acryking PH-720, Acryking Acryking PH-800 and Acryking PH-800N5A were tested on

Makrolon AL2647 clear only.

Note: Acryking K-101 is NOT suitable for use with or in front of a reflex reflector

Note: Acryking PH-710 and Acryking PH-720 test data was submitted by Mitsubishi Chemical Corporation

Note: Acryking PH-710 and Acryking PH-720 were tested on clear AL-2447 only

Note: Acryking PH-503, Acryking PH-511, Acryking PH-730, Acryking PH-740, Acryking PH-750, and

Acryking PH-930 were tested on Makrolon AL2447 and Makrolon AL 2647 551070 clear only.

Note: Acryking PH-328, Acryking PH-800 and Acryking PH-800N5A were tested on Makrolon AL2447 551070

clear only



Information on LHP100/LHC100, SHP300/SHC3000, SHP401/AS4000, SHP401/SHC4002, SHP470/AS4700,SHP470FT2050/AS4700, PHC587, PHC 587C, PHC 587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC3000K-Z, UVHC5000, UVHC5000K, UVHC5000K1, and UVHC5000K2:

Momentive Performance Materials Inc. Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: SHP3000/SHC3000 is NOT suitable for use with or in front of a reflex reflector.

Note: SHP470FT2050/AS4700 is only suitable for use on AL2447 and AL2647 in thickness 3.2 on color

751092.

MFR.

Note: All UVHC3000K test data submitted by Momentive Performance Materials, Inc.

Note: UVHC3000K1, UVHC3000K-Z, PHC 587C, PHC 587C2, UVHC3000K1-40, UVHC3000K1-50,

UVHC3000KZ60 and UVHC5000 was submitted by Momentive Performance Materials Inc.

Note: UVHC5000 was tested on clear AL2447 and AL2647 only.

Note: Makrolon® AL2447 MAS181 was tested with Momentive UVHC3000, UVHC5000, UVHC5000K, and

UVHC5000K1, UVHC5000K2 , UVHC3000K1-40 and UVHC3000K1-50

Note: UVHC8100 was tested on clear AL2447 and clear AL2647 Note: Makrolon® AL2447 MAS402 was tested with UVHC3000.

Note: Makrolon® AL2447 MAS402 with UVHC3000 data was submitted by Momentive Performance Materials.

Note: SHP470FT/AS4700 was tested on AL2447 and AL2647 Clear

Note: All Datea for SHP470FT/AS4700 was submitted by Momentive Performance Materials



Information on Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418
Evansville, IN 47703-0418
www.redspot.com

Note: All UVT test data submitted by Red Spot.

Note: UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were

tested on AL 2447 and AL 2647 clear only

Note: Makrolon 2245 was tested on UVT610V2 only. Only thicknesses above 2.3 mm may be used in front of a

reflex reflector.



Information of X-48-5500-A18 hard coat may be obtained by writing to the following address:

Shin-Etsu Chemical Co., Ltd. 4-1, Marunouchi 1-Chome Chiyoda-ku, Tokyo 100-0005, Japan www.shinetsu.co.jp

Note: X-48-5500-A18 was submitted by Shin-Etsu Chemical Co., Ltd.

Note: X-48-5500-A18 was tested on AL2447 clear only.

Information on SH-41, SH-50, SH-51, and SH-61 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: Stanley SH-51 and SH-61 submitted by Stanley Electric

Note: Stanley SH-51 only tested on clear Makrolon® AL2447 and AL2647. Note: Stanley SH-61 only tested on clear Makrolon® AL2447.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Diapolyacrylate Co., Ltd.	ACRYPET MD	Polymethyl Methacrylate	001 101 114	Clear Red Red
diap@anet.net.th			203 206	Yellow Yellow
Diapolyacrylate Co., Ltd. diap@anet.net.th	ACRYPET V	Polymethyl Methacrylate	011 101 114 131 146 147 148 149	Clear Red Red Red Red Red Red Red
			149 160 203 206 236 283 284 285 286 287	Red Red Yellow
			288 291 292	Yellow Yellow Yellow
Diapolyacrylate Co., Ltd. diap@anet.net.th	ACRYPET VE ACRYPET VHS ACRYPET VH4 ACRYPET VHM ACRYPET VHS ACRYPET VG ACRYPET ZVH SHINKOLITE P VE SHINKOLITE P VH SHINKOLITE P VH SHINKOLITE P VH	Polymethyl Methacrylate	001 361 PYR5406 007 PR5556 53260 54225 55475 55480 55485 55580 55670 57163 55780	Clear Clear Clear White White White White White White White White White White
			58154 101 111 112 113 116 117 120	White Red Red Red Red Red Red Red Red Red

	TRADE NAME AND			
MFR.	FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Diapolyacrylate	ACRYPET VE	Polymethyl	128	Red
Co., Ltd.	ACRYPET VES	Methacrylate	129	Red
diap@anet.net.th	ACRYPET VH		141	Red
	ACRYPET VH4		143	Red
	ACRYPET VHS		151 5101	Red
	ACRYPET VHS ACRYPET VG		5101 5101B	Red Red
	ACRYPET ZVH		5111	Red
	SHINKOLITE P VE		5112	Red
	SHINKOLITE P VES		5113	Red
	SHINKOLITE P VH		5114	Red
	SHINKOLITE P VHS		5115	Red
			5116	Red
			5117	Red
			5118	Red
			5121	Red
			5131 5444	Red
			5141 5142	Red Red
			5142	Red
			5151	Red
			PR5276	Red
			PR5296	Red
			5386	Red
			5456	Red
			203	Yellow
			209	Yellow
			252	Yellow
			253	Yellow
			254 255	Yellow Yellow
			256 256	Yellow
			257	Yellow
			258	Yellow
			259	Yellow
			262	Yellow
			263	Yellow
			264	Yellow
			265	Yellow
			266	Yellow
			267 270	Yellow Yellow
			290	Yellow
			2001	Yellow
			5203	Yellow
			5213	Yellow
			5223	Yellow
			5233	Yellow
			5253	Yellow
			5256	Yellow
			5283 5203	Yellow
			5293	Yellow
			5303 5313	Yellow
			5313	Yellow

5333

Yellow

MER.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Diapolyacrylate Co., Ltd. diap@anet.net.th	ACRYPET VES ACRYPET VH ACRYPET VHM ACRYPET VHS ACRYPET VG SHINKOLITE P VE SHINKOLITE P VH SHINKOLITE P VH SHINKOLITE P VHS	Polymethyl Methacrylate	5343 5353 5363 5373 5383 5403 5413 5423 531 53105 53110 53120 53130 53137 53140 53155 53160 53155 53168 53175 53178 53185 53183 53185 53187 53187 53187 53187 53187 53180 54107 54112 54115 54118 54120 54130 54132 54133 54135 54136 54136 54136 54136 54136 54137 54136 54137 54136 54136 54136 54136 54136 54136 54136 54137 54136 5413	Yellow Yellow Yellow Yellow Yellow Yellow Yellow Yellow Gray Gray Gray Gray Gray Gray Gray Gray
			54170	Gray

(Coating Information continued on the next page)

TYPE OF RESIN

NUMBER

COLOR

Coated Diapolyacrylate plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

FUJIHARD HH3012U-5, FUJIHARD HH3012U-6, FUJIHARD HH3012U-7, FUJIHARD HH3012U-8, FUJIHARD HH3012U-9, and FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3,: See Fujikura Kasei Co Ltd.

Stanley SH-61: See Stanley Electric

Coating Manufacturer in Alphabetical Order



Information on FUJIHARD HH3012U-5, FUJIHARD HH3012U-6, FUJIHARD HH3012U-7, FUJIHARD HH3012U-8, FUJIHARD HH3012U-9, and FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3, coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH3012U-5, FUJIHARD HH3012U-6, FUJIHARD HH3012U-7, FUJIHARD HH3012U-8, FUJIHARD HH3012U-9, and FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3, for use only on Acrypet VH grades.

Information on SH-61 hard coat may be obtained by writing to the following address:

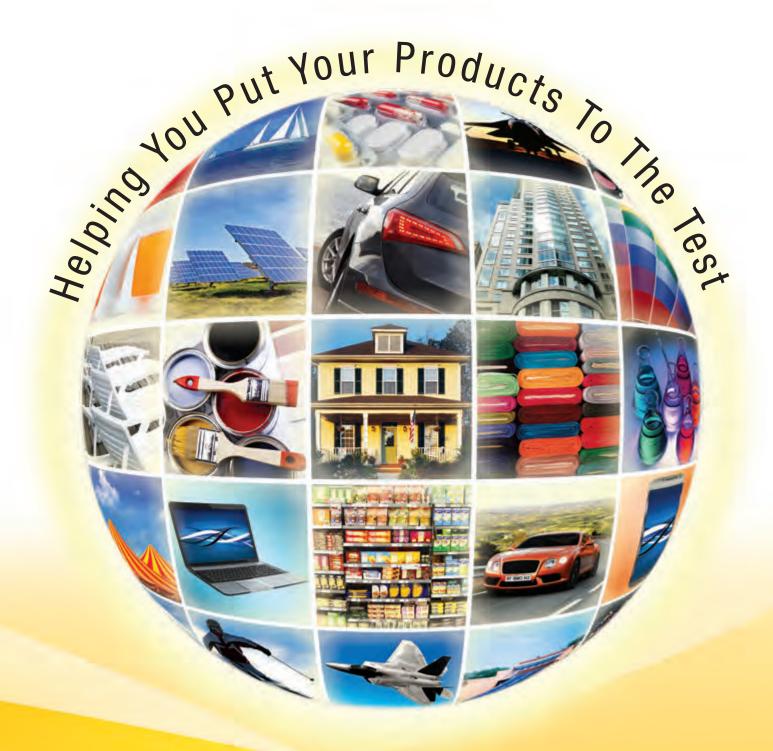
Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku Meguro-Ku, Tokyo 153, Japan www.stanley.co.jp

Note: Stanley SH-61 was only tested on Acrypet VH 001

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
The Dow Chemical Company	SILASTIC™ MS-1001 SILASTIC™ MS-1002	Moldable Silicone		Clear
www.dow.com				



ACCELERATING YOUR EXPERTISE



THE GLOBAL LEADER IN
PRODUCT DURABILITY, PERFORMANCE &
WEATHERING TESTING INSTRUMENTS & SERVICES



Instruments

Accelerated Weathering * Corrosion * Flammability * Solar Environmental * Technical Lighting

Ci Series Weather-Ometers



Atlas' flagship accelerated weathering instruments offer superior performance, innovative features, and large capacity.

- Water-cooled xenon arc lamps and advanced filter technology deliver the best simulation of natural sunlight
- Best-in-class uniformity for irradiance, temperature, relative humidity and spray
- Intuitive touch screen controls
- Custom testing capabilities

Xenotest® Instruments



These premium air-cooled accelerated weathering instruments offer an array of options to meet virtually all global weathering and lightfastness testing requirements.

- Designed with state-of-the-art controls
- On-rack radio-controlled sensor technology for superior monitoring of light and temperature
- High water and power efficiency

Corrosion Cabinets



The most sophisticated and versatile corrosion and salt fog cabinets available. Capable of replicating automatic cycling between several environmental conditions to reduce the need to move or otherwise handle test specimens.

- Design maximizes testing volume
- Large solution reservoir
- Optional features allow for simulation of several environmental conditions

SUNTEST® Family



The most widely used flatbed xenon test chambers available in tabletop or free standing models to meet lower testing capacity needs. Features include:

- Optical light filters to simulate indoor/ outdoor sunlight
- A variety of accessories ideal for testing realistic end-use conditions
- Best-in-class flatbed irradiance and temperature uniformity

UVTest



An economical fluorescent/UV weathering test instrument for product screening at lower operating costs.

- Simple touch screen operation and control in several languages
- Patented irradiance calibration safety access ports
- Remote Ethernet data acquisition application
- Recirculating spray water option

Flammability Chambers



Atlas flammability chambers offer unmatched accuracy, repeatability and safety when determining the burn rates and resistance of various materials.

- All chambers are easy to install and operate
- Specimen holders available to accommodate a variety of material types
- Chambers are available for appliance, aircraft and automotive applications

Solar Simulation Systems



Atlas Custom Systems designs and builds custom solar simulation systems such as walkin chambers or full-scale test facilities. These full scale test facilities use a series of highly coordinated metal halide lights to provide uniform radiant energy to meet the demanding testing needs of many industries.

Solar Environmental Chambers



A group of integrated, easy-to-use test chambers for various solar and environmental applications. These instruments combine environmental simulation with metal halide lighting technology and are ideal for testing medium to large sized automotive, plastics, electronics and 3D components, finished products as well as PV modules.

Technical Lighting Systems



Atlas/KHS technical lighting systems are designed for high-speed photography and video. These systems are ideal for crash testing and other safety experiments, custom designed to match the complex illumination requirements of various test configurations. Available with conventional HMI light sources or the latest LED technology, these lighting systems offer an array of solutions for analytical testing of high speed events.

Our mission is to help our customers worldwide provide the most reliable and durable product solutions through our combined experience and expertise in weathering instruments and testing, custom capabilities, consulting and global support.

Services

Natural & Accelerated Weathering Testing * Evaluations * Consulting * Technical Support * Client Education

Natural Weathering Services



Atlas offers outdoor weathering sites worldwide to ensure factors from a variety of climates can be tested.

- Static Exposure Testing
- ◆ Sun Tracking Exposure Testing
- ◆ EMMAQUA® Accelerated Outdoor Testing
- Ultra-Accelerated Weathering Testing
- Automotive Exposure Testing (Samples, Components, Complete Vehicles)

Evaluation Services



Atlas offers a wide range of evaluation and measurement services for your specimens during and after the weathering process.

- Instrumental Color/Gloss Measurements
- Visual Evaluations
- ◆ Photography/IR Imaging
- Emittance
- ◆ Spectral Transmittance/Reflectance
- ◆ Solar Reflectance Index
- Additional Optical Property Measurements

Accelerated Laboratory Weathering Services



Atlas Weathering Services Group operates one of the largest networks of ISO/IEC 17025 accredited accelerated weathering testing laboratories in the world. Our indoor exposure labs offer artificial accelerated weathering tests and a variety of other environmental test programs, all designed to accurately simulate true enduse conditions and meet global weathering standards.

Consulting Solutions



Atlas Consulting Solutions offers design and implementation of environmental durability testing methods, programs, and strategies. Our international group of weathering experts help you achieve your objectives through all stages of the value chain from materials to components, systems to end-use products.

Worldwide Technical Support



Proper maintenance is critical in order for your instrument to operate at peak performance. Atlas' AMECARE Performance Services Program ensures that your instrument will operate optimally at all times. Benefits include:

- Preventative maintenance inspections
- Scheduled ISO accredited calibrations (where available)
- Detailed service reports with professional assessment of key components

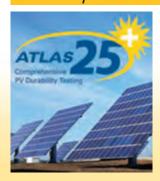
Client Education & Training



Atlas offers an array of resources designed to advance your weathering education and provide you with the knowledge you need to successfully meet your testing requirements. Events include:

- Seminars
- Workshops
- Webcasts
- ◆ In-House Programs
- Technical Conferences

Solar Industry Solutions



Atlas offers a complete portfolio of testing services to evaluate the performance, durability and reliability of solar cells, modules, complete arrays, concentrated solar power products and solar thermal collectors. Atlas also offers its proprietary Atlas 25^{+®} long-term durability testing program for solar modules.



Ultra-Accelerated EMMA®







THE BENEFITS OF ULTRA-ACCELERATED TESTING

What is the Ultra-Accelerated EMMA®?

The Ultra-Accelerated EMMA (UA-EMMA) is Atlas' latest advancement in natural exposure testing. This new outdoor testing device delivers approximately 10-12 years of equivalent radiation exposure as would be received in a standard outdoor testing rack in South Florida in a single year.

The system achieves this accelerated exposure through a patented "cool mirror" technology that has very high reflectance in the UV and near visible wavelength ranges while attenuating reflectance in the longer wavelength visible and IR portions of the solar spectrum.

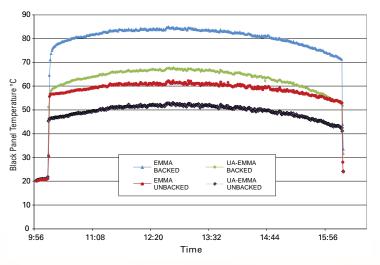


What are the Advantages?

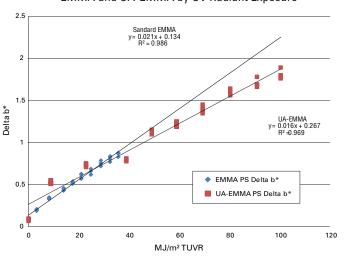
The new UA-EMMA system allows for greatly accelerated testing while fulfilling three critical testing requirements:

- Exposes many different types of materials to ultra-high UV irradiance
- Maintains high fidelity to the natural solar UV spectrum
- Keeps specimens at acceptable exposure temperatures

Black Panel Temperature Performance UA-EMMA vs. Standard EMMA Data



Comparison of Polystyrene (PS) Reference Material in Standard EMMA and UA-EMMA by UV Radiant Exposure



Phoenix to New River, Arizona. The EMMAQUA device is redesigned with a steel framework and more efficient spray delivery system



Atlas' DSET Laboratories relocates from

EMMAQUA+®, the next generation of accelerated for more efficient delivery of full-spectrum solar

Ideal Materials for UA-EMMA® Testing

- Materials that require a long service life
- Transparent and glazed materials
- Temperature sensitive materials such as PVC
- Coatings applied to metal panels
- Materials that perform well in EMMA or EMMAQUA exposure testing

EMMAQUA® Weathering Standards

The table below lists selected standards for EMMAQUA exposure. For details, refer to the individual standards. Test methods which are proprietary to individual companies and which also specify Fresnel-based exposure methods are not listed here.

EMMAQUA STANDARD	SCOPE	COUNTRY
ISO 877-3	Plastics	International
ASTM D3841	Glass-fiber reinforced polyester	USA
ASTM D4141	Coatings	USA
ASTM D4364	Plastics	USA
ASTM D5722	Coated hardboard	USA
ASTM E1596	PV modules	USA
ASTM G90	Non-metallic materials	USA
SAE J576	Optical automotive plastics	USA
SAE J1961	Automotive exterior	USA
SAE-AMS-T-22085	Preservation sealing tape	USA
JIS Z2381	General	Japan

Applications

- Adhesives
- Agricultural Films
- **Automotive Exteriors**
- **Building Materials**
- Elastomers
- Glass (Architectural & Automotive)
- Packaging
- Paints & Coatings
- **Plastics**
- Roofing
- Sealants



The MQ3K is launched, utilizing state-of-theart technology in computer-controlled cycle programming, more accurate altazimuth solar tracking, one-touch start/stop, error sensing feedback and the most-specular mirrors available.



1999



Atlas introduces four patented suites of Temperature-Controlled EMMAQUA. (Static.) Night, Dynamic Temperature and Variable Irradiance Control). This breakthrough allows for the testing of materials that are sensitive

to thermal buildup.

Atlas introduces the UA-EMMA the latest advancement in outdoor accelerated testing. This device couples the EMMA platform with a new patented mirror system, optimizing real-world correlation.



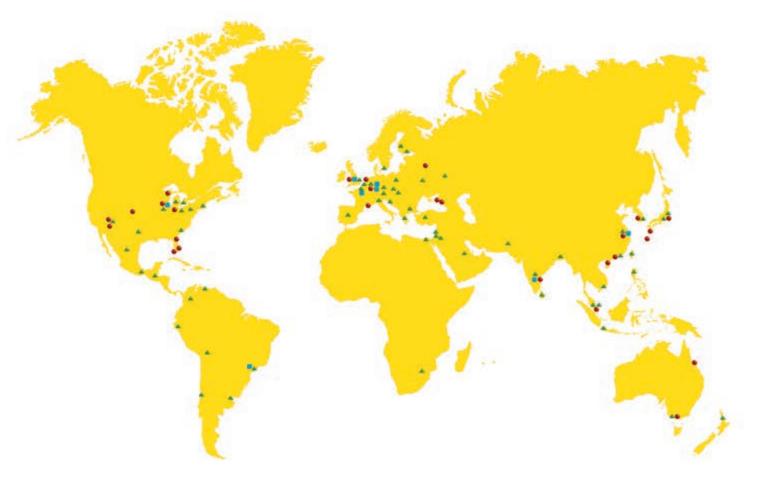
2004

The first EMMAQUA® device, constructed with a wooden frame and sheet metal skin. is patented, manufactured and placed into

1958

weathering devices, is introduced. Advancements include individual cycle programming, black panel temperature control, and altazimuth solar tracking

1986



Global Support, Weathering Exposure Sites & Laboratories

Corporate Offices

Chicago, Illinois USA Linsengericht, Germany Shanghai, China São Paulo, Brazil Élancourt, France Mörfelden-Walldorf, Germany Bangalore, India Leicester, United Kingdom

Outdoor Exposure Sites & Laboratories

Miami, Florida USA • Phoenix, Arizona USA • Sanary, France • Chicago, Illinois USA • Duisburg, Germany • Leicester, United Kingdom Hoek van Holland, The Netherlands • Chennai, India • Prescott, Arizona USA • Loveland, Colorado USA • Medina, Ohio USA Keys, Florida USA • Jacksonville, Florida USA • Alberta, Michigan USA • Hainan, China • Guangzhou, China Seosan, Korea • Miyakojima, Okinawa, Japan • Choshi, Japan • Kirishima, Japan Singapore • Melbourne, Australia • Townsville, Australia • Novorossiysk, Russia Gelendzhik, Russia • Moscow, Russia

▲ Local Sales & Service Support

To contact your local Atlas Sales representative please visit http://atlas-mts.com/contact/local-representatives/
For general inquiries please contact us at atlas.info@ametek.com

www.atlas-mts.com

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

NUMBER

COLOR

Formosa Idemitsu Petrochemical Corp.

TARAFLON IV1900R TARAFLON IV2200R Polycarbonate

Clear Q

www.idss.co.jp/

MFR.

Coated Formosa Idemitsu Petrochemical Corp. plastics may only be used when treated with the following acceptable coating applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328 and Acryking PH-328: See Mitsubishi Chemical Corporation

PHC587, PHC 587C, and PHC 587C2: See Momentive Performance Materials, Inc.

SH-41 and SH-50 (only IV2200R and IV2200R1): See Stanley Electric

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60 and UVHC3000K: See Momentive Performance Materials, Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

Coating Manufacturer in Alphabetical Order



Information on Mitsubishi Chemical Corporation Acryking F-328 and Acryking PH-328, may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp



Information on UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, PHC587 and PHC587 C2 hard coat may be obtained by writing to the following:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany

Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

(Coating Information continued on the next page)



MFR.

Information on Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8, coatings may be obtained by writing to the following address:

TYPE OF RESIN

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Information on SH-41 and SH-50 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku Meguro-Ku, Tokyo 153, Japan www.stanley.co.jp

TRADE NAME AND MFR. FLOW FORMULATION TYPE OF RESIN NUMBER COLOR

Idemitsu TARFLON IV1900R Polycarbonate Clear Q

Kosan TARFLON IV2200R Co., Ltd. (coated applications only)

www.idss.co.jp/

Coated Idemitsu Kosan Co., Ltd. plastics may only be used when treated with the following acceptable coating applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, and Acryking PH-328: See Mitsubishi Chemical Corporation

PHC587: See Momentive Performance Materials, Inc.

SH-41 and SH-50 (only IV2200R): See Stanley Electric

UVHC3000C, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60 UVHC3000K, UVHC3000K1-40, UVHC3000K1-50, and UVHC3000KZ60: See Momentive Performance Materials, Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

Coating Manufacturer in Alphabetical Order



Information on Mitsubishi Chemical Corporation Acryking F-328, and Acryking PH-328 may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp



Information on UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, PHC587C2, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, PHC587 and PHC 587C hard coat may be obtained by writing to the following:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

(Coating information continued on the next page)

Clear



Information on Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Information on SH-41 and SH-50 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Idemitsu	LC1500	Inner Lens
Kosan	LC1505	Polycarbonate
Co., Ltd.	LC1700	,
	LC2200	

www.idss.co.jp

Note: Idemitsu Kosan Inner Lens Materials were tested behind clear coated IV1900R

Idemitsu	TARFLON V1500	Polycarbonate	C901	Clear \$
Kosan	TARFLON V1700	•	C902	Clear \$
Co., Ltd.	TARFLON V1900		C903	Clear \$
	TARFLON V2200		R901	Red \$
www.idss.co.jp/	TARFLON V2500		R902	Red \$
	TARFLON V2700		R903	Red \$
	TARFLON V3000		R904	Red \$
	(coated or uncoated)		R905	Red \$
	,		Y901	Yellow \$
(formerly Idemitsu Pet	trochemical Co., Ltd.)		Y902	Yellow \$
`	. ,		Y903	Yellow \$
			Y904	Yellow \$
			Y905	Yellow \$

Coated Idemitsu Kosan Co. Ltd. plastics may only be treated with the following coatings applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking K-101: See Mitsubishi Chemical Corporation

TARFLONCOAT 101 or TARFLONCOAT 201: See Idemitsu Kosan Co., Ltd.

(Coating information continued on the next page)

Coating Manufacturer in Alphabetical Order

Information on Tarfloncoat 101 and Tarfloncoat 201 coatings may be obtained by writing to the following address:

Idemitsu Kosan Co., Ltd. 1-1, Marunochi 3-Chome, Chiyoda-Ku, Tokyo 100 Japan www.idss.co.jp/



Information on Mitsubishi Chemical Corporation Acryking K-101 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
INEOS Styrolution America, LLC	NAS® XC NAS® XC UV	Styrene Methyl Methacry	/late	Clear
www.ineos-styrolutio	on.com			

MFR.	FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR	_
KCC Silicone Corp	ENA8520MH(LV)	Moldable Silicone		Clear	_
https://www.kccsilico	one.com/main.do				

MFR.		NAME AND CORMULATION	TYPE OF RESIN	NUMBER	COLOR
(unama):		DADADET LID	Deliverenthy	4000	Class
Kuraray		PARAPET HR	Polymethyl	1000	Clear
Co., Ltd.		PARAPET HR-F PARAPET HR-G	Methacrylate	11095 11161	Clear Clear
MANA KUrorovo	homical com	PARAPET HR-G PARAPET HR-H		12064	Clear
www.kurarayc	nemical.com	PARAPET HR-L		12065	Clear
		PARAPET HR-LE		14146	Clear
		PARAPET HR-N		14148	Clear
		PARAPET HR-S		16569	Clear
		PARAPET HR-X		1103	Red
		PARAPET HR-Z		1104	Red
		PARAPET GR		1106	Red
		PARAPET HR-X		1111	Red
				1116	Red
				1173	Red
				1175	Red
				11008	Red
				11009	Red
				11010	Red
				11015	Red
				11023	Red
				11025	Red
				11028	Red
				11029	Red
				11030	Red
				11031	Red
				11035	Red
				11036	Red
				11037	Red
				11038	Red
				11039	Red
				11040	Red
				11041	Red
				11042	Red
				11046	Red
				11048	Red
				11050 11051	Red Red
				11051	Red
				11052	Red
				11054	Red
				11055	Red
				11056	Red
				11057	Red
				11072	Red
				11083	Red
				11107	Red
				11120	Red
				11121	Red
				11152	Red
				11153	Red
				11165	Red
				11175	Red
				11178	Red

	E NAME AND FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Kuraray Co., Ltd. www.kuraraychemical.com	PARAPET HR PARAPET HR-F PARAPET HR-H PARAPET HR-L PARAPET HR-L PARAPET HR-N PARAPET HR-S PARAPET HR-X PARAPET HR-Z PARAPET GR PARAPET HR-X	Polymethyl Methacrylate	11180 11181 11182 11188 11196 11194 11222 1207 1208 1237 1240 1241 1242 1244 12008 12013 12019 12021 12062 12067 12068 17020 17021 17023 17040 17047 17048 17049 17050 17051 17052 17056 17073 17074 17075 17086 17077 17078 17079 17073 17074 17075 17086 17075 17086 17071 17072 17073 17074 17075 17086 17090 17090 17101 17105 17116 17116 171192 17209 10247 11161 11176	Red Red Red Red Red Red Red Red Relow Yellow
			11198	Gray

	E NAME AND FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Kuraray Co., Ltd. www.kuraraychemical.com	PARAPET HR PARAPET HR-F PARAPET HR-H PARAPET HR-L PARAPET HR-LE PARAPET HR-N PARAPET HR-S PARAPET HR-X PARAPET HR-Z PARAPET GR PARAPET HR-X	Polymethyl Methacrylate	12048 16072 16073 16074 16081 16333 16365 16384 16395 16396 16421 16422 16423 16424 16425 16426 16427 16428 16429 16430 16431 16432 16433 16434 16435 16456 16457 16458 16459 16565 16570 16574 17172 16071 17063 17079 17212 17213	Gray Gray Gray Gray Gray Gray Gray Gray
Kuraray Co., Ltd. www.kuraraychemical.com	PARAPET EH PARAPET GH PARAPET HA PARAPET SH	Polymethyl Methacrylate	1000	Clear
Kuraray Co., Ltd. www.kuraraychemical.com	PARAPET SH-N	Polymethyl Methacrylate	1000 11099 11100 12042 17174 16437	Clear Red Red Yellow Yellow Grey

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
LG Chem, Ltd. www.lgchem.co	LUPOY PC 1303AH-10 LUPOY PC 1303AH-15 LUPOY PC 1303AH-22 LUPOY PC 1303AH-30 (coated or uncoated)		W10T W099 W099 W099 W099 R075 Y018	White Q White \$ White \$ White \$ White \$ Red \$ Yellow \$
(formerly LG-Pe	olycarbonate Ltd.)			***************************************

Coated LG Chem Ltd. plastics are listed with only the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7, FUJIHARD HH3035U-3, and FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

PHC587C, PHC587C2: See Momentive Performance Materials Inc.

SH-42 and SH-51 (only on W10T): See Stanley Electric

SHP401/AS4000 hard coat: See Momentive Performance Materials Inc.

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1 UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, and UVHC3000KZ60: See Momentive Performance Materials Inc.

Coating Manufacturer in Alphabetical Order



Information on FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7, FUJIHARD HH3035U-3, and FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3 coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shinbakeon 2-Chome Minato-Ku Tokyo, 105-0011 Japan www.fkkasei.co.jp



Information on SHP401/AS4000, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60 PHC587C, and PHC587C2 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Inc. Building V7 51368 Lverkusen Germany Momentive Performance Materials 260 Hudson River Road Waterford, NY 12118 www.momentive.com

(Coating Information continued on the next page)

TRADE NAME AND MFR. FLOW FORMULATION TYPE OF RESIN NUMBER COLOR

Information on SH-42 and SH-51 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

NOTE: SH-42 and SH-51 were tested on W10T only.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
LX MMA Corp.	EG-930	Polymethyl		Clear
•	EG920	Meťhacryľate	4001	Red
	EH-910		4002	Red
www.lxmma.com			4003	Red
	IH830A		4006	Red
(Formerly LGMM/	4 IH830C		4009	Red
Corp.)	IH830CA IH830HF		4070 40010	Red Red
	IH830HR		40010	Red
	IH830HT		40020	Red
	IH830L		40040	Red
	IH830SR		40050	Red
	IH830XT		40060	Red
	HI835MS		40061	Red
	HI835H		40070	Red
	HI532		41831	Red
	HI533		41943	Red
	HP202		41979	Red
	HR315		42001	Red
	HR323		42015	Red
	R830C3		42025	Red
	R830C5		42030	Red
	R830HFC3		42032	Red
	R830HFC5		42033	Red
			42037	Red
			42055 42066	Red Red
			42068	Red
			42070	Red
			42071	Red
			42087	Red
			42089	Red
			42101	Red
			42140	Red
			42142	Red
			42146	Red
			42153	Red
			2001	Yellow
			2002	Yellow
			2559	Yellow
 Note: IG- 	840 is now called as IH-830A		2561	Yellow
 Note: IH8 	30CA, EG920, IH830HR, HI83	5MS, HI835H, HP202 only	20010 20020	Yellow Yellow
comply w	ith FMVSS 108 in 2.0 mm thro	ugh 3.2 mm thicknesses.	20020	Yellow
 Note: HR 	323 complies with FMVSS 108	at 1.6 mm and from 3.2-	20040	Yellow
6.4 mm	·		30010	Yellow
 Note: IH8 	30L is not to be used as a refle	ex reflect or or in front of a	30040	Yellow
	n thickness 6.4 mm		2568	Amber
 Note: Col 	ors ID191 White, 2568 Amber,	2569 Amber, 61547	2569	Amber
	80 Gray, 83481Gray, 83530 G		83295	Gray
	on IH830C		83480	Gray
	or ID191 White is not to be use	ed as a reflex reflector or in	83481	Gray
	reflex reflector.		83482	Gray
	or 2569 Amber in 6.4 mm thick	ness is not to be used as	83520	Gray
	eflector or in front of a reflex ref		83523	Gray
 Note: Col 	or 61547 Blue is not to be used	d as a reflex reflector or in	83529	Gray
front of a	reflex reflector in any thickness	6	83530	Gray
	-		83566	Gray

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
LX MMA Corp.	EG-930 EG920 EH-910	Polymethyl Methacrylate	83569 83579 83585	Gray Gray Gray
www.lxmma.com	IH830 IH830A		8001 ID191	Gray White
(Formerly LGMMA Corp.)	IH830C IH830CA IH830HF IH830HR IH830HT IH830L IH830SR IH830XT HI835MS HI835H HI532 HI533 HP202 HR315 HR323 R830C3 R830C5 R830HFC3 R830HFC3		61547	Blue





MFR.

Lotte Chemical Corp.

LT-1100 LT-1220 (coated) Polycarbonate

Clear Q

www.lottechem.com

Coated Lotte Chemical Corp. plastics are only acceptable with the coatings listed below when properly applied to the molded lens. Lotte Chemical Corp. plastics cannot be used uncoated.

Coating in Alphabetical Order and Corresponding Manufacturer

KUV-5000: See KCC Corporation

SH-42 and SH-51: See Stanley Electric

UVHC3000, UVHC5000: See Momentive Performance Materials Inc.

UVT610V2, UVT610V3: See Red Spot

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red

Spot

Coating Manufacturer in Alphabetical Order



Information on KUV-5000 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr



Information on UVHC3000 and UVHC5000 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany

Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: Lotte Chemical Corp. Plastics are only to be used in a production process approved and monitored by Momentive Performance Materials

Note: Lotte Chemical Corp. LT-1100 & LT-1220 with UVHC3000 must be coated to pass 7% haze.

Note: Lotte Chemical Corp. LT-1220 with UVHC3000 over 3.2mm cannot be used as a reflex reflector or infront of a reflex reflector.

(Coating Information continued on the next page)



Information on UVT610V2, UVT610V3, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Lotte Chemical Corp. LT-1220 with UVT610V2 and UVT610V3 is not listed over 3.2 mm.

 $Note:\ UVT820V1,\ UVT820V2,\ UVT820V3,\ UVT820V4,\ UVT820V5,\ UVT820V6,\ UVT820V7\ and\ UVT820V8\ were$

tested on Lotte LT-1110 and Lotte LT-1220.

Information on Stanley Electric SH-42, and SH-51 may be obtained by writing to the following company:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: Thickness 6.4 mm of Lotte Chemical Corp. LT-1100 & SH-42, LT-1220 & SH-42, and LT-1220 & SH-51 cannot be used as a reflex reflector or in front of a reflex reflector.



MFR.

Lotte Chemical Corp.

PC-1000L Polycarbonate

100

Clear Q

www.lottechem.com

Coated Lotte Chemical Corp. plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

KUV-2000, KUV-3000 and KUV-5000: See KCC Corporation

UVHC3000, UVHC5000: See Momentive Performance Materials Inc.

UVT610V2 and UVT820: See Red Spot

Coating Manufacturer in Alphabetical Order



Information on KUV-2000, KUV-3000 and KUV-5000 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr



Information on UVHC3000 and UVHC5000 hard coat may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com



Information on UVT610V2 and UVT820 coating may be obtained by writing to the following address:

PAINT & VARNISH COMPANY, INC.

Red Spot Paint & Varnish Co., Inc. P.O. Box 418
Evansville, IN 47703-0418
www.redspot.com

Note: Red Spot UVT610V2 was only tested on a 3.2mm lens

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Lotte MCC Corporation	ACRYPET VH ACRYPET VHM	Polymethyl Methacrylate	001 111	Clear Red
Corporation	ACRYPET VG	well aci yiale	112	Red
	ACRYPET ZVH		121	Red
www.lottemcc	.com		PR5296	Red
			101	Red
(Formery Lotte	e MRC Corp.)		113	Red
			116	Red
			117	Red
			120	Red
			128	Red
			129 141	Red
			151	Red Red
			5101	Red
			5111	Red
			5112	Red
			5113	Red
			5114	Red
			5115	Red
			5117	Red
			5118	Red
			5121	Red
			5143	Red
			5151	Red
			209	Yellow
			258	Yellow
			259	Yellow
			533	Grey
			53137	Grey
			53140 53150	Grey Grey
			53155	Grey
			53160	Grey
			53165	Grey
			53170	Grey
			53175	Grey
			53183	Grey
				- ,

MFR.		NAME AND CORMULATION	TYPE OF RESIN	NUMBER	COLOR
		DIAKON OLOGOO	Dilimital	004	
Lucite		DIAKON CLG902	Polymethyl	001	Clear
International		DIAKON CLG902L	Methacrylate	006	Clear
U.K.)		DIAKON CLG904		007	Clear
		DIAKON CMG302		011	Clear
vww.luciteintern	ational.com	DIAKON CMG302S		0P11	Clear
		DIAKON CMG314		9047	Neutral
		DIAKON CMG314N		9051	Neutral
		DIAKON CMG314R		9184	Neutral
		DIAKON CMG314V		9195	Neutral
		DIAKON CMG334V		9197	Neutral
		DIAKON CMH450		9198	Neutral
		DIAKON CMH454L		405	Red
		DIAKON CMH454V		413	Red
		DIAKON HS3120		415	Red
		DIAKON MG114		416	Red
		DIAKON MH254		417	Red
		DIAKON ST10H8L		418	Red
		DIAKON ST15G8		419	Red
		DIAKON ST15H8L		421	Red
		DIAKON ST20G8		422	Red
		DIAKON ST20H8L		425	Red
		DIAKON ST25G7		428	Red
		DIAKON ST25G8		433	Red
		DIAKON ST25H8L		435	Red
		DIAKON ST35G7		436	Red
		DIAKON ST35G8		437	Red
		DIAKON ST35H8L		438	Red
		DIAKON TD5H05L		439	Red
		DIAKON TD5H10L		440	Red
		DIAKON TD5H15L		442	Red
		DIAKON TD5H25L		4088	Red
		DIAKON TD5H42L		4114	Red
		DIAKON TD510		4132	Red
		DIAKON TD515		4162	Red
		DIAKON TD525		4163	Red
		DIAKON TD542		4169	Red
		DIAKON TD825		4194	Red
		DIAKON TD842		4209	Red
				4222	Red
				4223	Red
				4232	Red
				4234	Red
				4235	Red
				4236	Red
				4237	Red
				4238	Red
				4239	Red
				4248	Red
				4249	Red
				4255	Red
				4256	Red
				4259	Red
				4260	Red
				4261	Red

TR	ADE NAME AND			
MFR. FL	OW FORMULATION	TYPE OF RESIN	<u>NUMBER</u>	COLOR
Lucite	DIAKON CLG902	Polymethyl	4262	Red
International	DIAKON CLG902L	Methacrylate	4263	Red
(U.K.)	DIAKON CLG904	Worldon yluto	4264	Red
(0.14.)	DIAKON CMG302		4265	Red
www.lucitesolutions.com			4266	Red
	DIAKON CMG314		4267	Red
	DIAKON CMG314N		4268	Red
	DIAKON CMG314R		4269	Red
	DIAKON CMG314V		4270	Red
	DIAKON CMG334V		4271	Red
	DIAKON CMH450		4272	Red
	DIAKON CMH454L		4273	Red
	DIAKON CMH454V		4281	Red
	DIAKON HS3120		4286	Red
	DIAKON MG114		4287	Red
	DIAKON MH254		4P01	Red
	DIAKON ST10H8L		310	Yellow
	DIAKON ST15G8		311	Yellow
	DIAKON ST15H8L		312	Yellow
	DIAKON ST20G8		314	Yellow
	DIAKON ST20H8L		316	Yellow
	DIAKON ST25G7		317	Yellow
	DIAKON ST25G8		318	Yellow
	DIAKON ST25H8L DIAKON ST35G7		319 3064	Yellow Yellow
	DIAKON ST35G7 DIAKON ST35G8		3069	Yellow
	DIAKON ST35H8L		3071	Yellow
	DIAKON TD5H05L		3080	Yellow
	DIAKON TD5H10L		3081	Yellow
	DIAKON TD5H15L		3103	Yellow
	DIAKON TD5H25L		3104	Yellow
	DIAKON TD5H42L		3150	Yellow
	DIAKON TD510		3151	Yellow
	DIAKON TD515		3152	Yellow
	DIAKON TD525		3153	Yellow
	DIAKON TD542		3154	Yellow
	DIAKON TD825		3161	Yellow
	DIAKON TD842		3162	Yellow
			3163	Yellow
			3164	Yellow
			3165	Yellow
			6150	Green
			9388	Grey

Note: Red 4281 listed in 1.6mm only.

For Lucite International (U.S.A.) please see Plaskolite.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Luminit	PRO10676	Inner Lens	10676	Red

www.luminitco.com

Note: Luminit PRO10676 materials were tested on LEXAN™ HP92W behind Arkema Plexiglas V-52i Med Red outer lenses or on Covestro 503 behind Arkema V-52i 2.3 and 3.2mm outer lenses.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi Chemical Corporation	ACRYPET TN 100	Polymethyl Methacrylate	001	Clear
Mitsubishi Chemical Corporation www.m-chemica	ACRYPET UT 100 ACRYPET UT 200 SHINKOLITE UT 100 SHINKOLITE UT 200	Polymethyl Methacrylate	001 011 101 111 121 203 254 264 601	Clear Clear Red Red Red Yellow Yellow Yellow Grey
Mitsubishi Chemical Corporation www.m-chemica	ACRYPET IR ACRYPET NAV SHINKOLITE P IR SHINKOLITE P NAV IL.co.jp	Polymethyl Methacrylate	001 011 101 112 113 116 117 121 5101 203 254 255 256 257 258 259 264 265 5203 531 541 53160 53170 53180 53190 54115 54135 54160 54165 54170	Clear Clear Red Red Red Red Red Red Pellow P
Mitsubishi Chemical Corporation www.m-chemical	ACRYPET MD SHINKOLITE P MD	Polymethyl Methacrylate	001 101 114 203	Clear Red Red Yellow

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi Chemical Corporation www.m-chemical	ACRYPET V SHINKOLITE P V .co.jp	Polymethyl Methacrylate	001 011 101 114	Clear Clear Red Red

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi Chemical Corporation	ACRYPET V SHINKOLITE P V	Polymethyl Methacrylate	131 146 147	Red Red Red
www.m-chemical.co	<u>.jp</u>		148 149	Red Red
			160 203	Red Yellow
			236	Yellow
			283	Yellow
			284	Yellow
			285 286	Yellow Yellow
			287	Yellow
			288	Yellow
			291	Yellow
			292	Yellow
Mitsubishi	ACRYPET VE	Polymethyl	PDA0010	Clear
Chemical	ACRYPET VES ACRYPET VH	Methacrylate	PDA0020	Clear Clear
Corporation	ACRYPET VH3F		PDA0030 PDA0040	Clear
www.m-chemical.co			PDA0050	Clear
	ACRYPET VH4F		PDA0013	Clear
	ACRYPET VHM		PDA0023	Clear
	ACRYPET VHS ACRYPET VG		PDA0033 PDA0043	Clear Clear
	ACRYPET VG ACRYPET ZVH		PDA0043 PDA0053	Clear
	SHINKOLITE P VE		001	Clear
	SHINKOLITE P VES		361	Clear
	SHINKOLITE P VH		PYR5406	Clear
	SHINKOLITE P VHS		007 PR5556	White White
			53260	White
			54225	White
			55475	White
			55480 55485	White
			55485 55580	White White
			55670	White
			57163	White
			55780	White
			58154 101	White Red
			111	Red
			112	Red
			113	Red
			116	Red
			117 120	Red Red
			121	Red
			128	Red
			129	Red
			141	Red
			143 151	Red Red
			101	1100

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi	ACRYPET VE	Polymethyl	5101	Red
Chemical	ACRYPET VES	Methacrylate	5101B	Red
Corporation	ACRYPETVH	Methaciylate	5111	Red
Corporation	ACRYPET VH3F		5112	Red
	ACRYPET VH4		5113	Red
	ACRYPET VH4F		5114	Red
www.m.chomical	.co.jp ACRYPET VHM		5115	Red
www.m-cnemical	ACRYPET VHS		5116	Red
	ACRYPET VIS		5117	Red
	ACRYPET ZVH		5118	Red
	SHINKOLITE P VE		5121	Red
	SHINKOLITE P VES		5131	Red
	SHINKOLITE P VH		5141	Red
	SHINKOLITE P VHS		5142	Red
			5143	Red
			5151	Red
			PR5276	Red
			PR5296	Red
			5386	Red
			5456	Red
			203	Yellow
			209	Yellow
			252	Yellow
			253	Yellow
			254	Yellow
			255	Yellow
			256	Yellow
			257	Yellow
			258	Yellow
			259	Yellow
			262	Yellow
			263	Yellow
			264	Yellow
			265	Yellow
			266	Yellow
			267	Yellow
			270	Yellow
			290	Yellow
			2001 5203	Yellow Yellow
			5213	Yellow
			5223	Yellow
			5233	Yellow
			5253	Yellow
			5256	Yellow
			5283	Yellow
			5293	Yellow
			5303	Yellow
			5313	Yellow
			5333	Yellow
			5343	Yellow
			5353	Yellow
			5363	Yellow

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi	ACRYPET VE	Polymethyl	5373	Yellow
Chemical	ACRYPET VES	Methacrylate	5383	Yellow
Corporation	ACRYPET VH	-	5393	Yellow
	ACRYPET VH3F		5403	Yellow
www.m-chemical.co			5413	Yellow
	ACRYPET VIIIA		5423	Yellow
	ACRYPET VHM		531	Gray
	ACRYPET VHS ACRYPET VG		533 541	Gray Gray
	ACRYPET ZVH		53105	Gray
	SHINKOLITE P VE		53110	Gray
	SHINKOLITE P VES		53120	Gray
	SHINKOLITE P VH		53130	Gray
	SHINKOLITE P VHS		53137	Gray
	SHINKOLITE P VHS		53140	Gray
			53150	Gray
			53155	Gray
			53160	Gray
			53165 53168	Gray
			53170	Gray Gray
			53175	Gray
			53178	Gray
			53180	Gray
			53183	Gray
			53185	Gray
			53187	Gray
			53190	Gray
			54107	Gray
			54110	Gray
			54112	Gray
			54115 54118	Gray
			54110	Gray Gray
			54130	Gray
			54132	Gray
			54133	Gray
			54135	Gray
			54140	Gray
			54145	Gray
			54155	Gray
			54160	Gray
			54165	Gray
			54170	Gray

Coated Mitsubishi Chemical Corporation plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

FUJIHARD HH3012U-5, FUJIHARD HH3012U-6, FUJIHARD HH3012U-7, FUJIHARD HH3012U-8, FUJIHARD HH3012U-9, and FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3,: See Fujikura Kasei Co Ltd.

(Coating information continued on the next page)

Coating Manufacturer in Alphabetical Order



Information on FUJIHARD HH3012U-5, FUJIHARD HH3012U-6, FUJIHARD HH3012U-7, FUJIHARD HH3012U-8, FUJIHARD HH3012U-9, FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, and FUJIHARD HH3035U-3, coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH3012U-5, FUJIHARD HH3012U-6, FUJIHARD HH3012U-7, FUJIHARD HH3012U-8, FUJIHARD HH3012U-9, and FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3, for use only on Acrypet VH grades.

Mitsubishi Chemical	CLEARLAC M100 CLEARLAC M101	METHYL Methacrylate/	001 101	Clear Red
Corporation	CLEARLAC M102	STYRENE	5101	Red
www.m-chemica	l.co.ip	COPOLYMER	203 5203	Yellow Yellow
			531	Gray
			541	Gray

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi Chemical Polymer Nantong Co., Ltd. www.mrpn.com.cn	ACRYPET VES ACRYPET VH ACRYPET VHM ACRYPET VHS ACRYPET VG ACRYPET ZVH SHINKOLITE P VE SHINKOLITE P VH SHINKOLITE P VH SHINKOLITE P VHS	Polymethyl Methacrylate	001 361 PYR5406 007 PR5556 53260 54225 55475 55480 55485 55580 55670 57163 55780 58154 PTS0074 101 111 112 113 116 117 120 121 128 129 141 143 151 5101 5101B 5111 5101 5101B 5111 5112 5113 5114 5115 5116 5117 5118 5117 5118 5117 5118 5117 5118 5121 5131 5141 5142 5143 5151 PR5276 PR5296 5386 5456 203 209 252 253 254	Clear Clear Clear White Red Red Red Red Red Red Red Red Red Re

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
MFR. Mitsubishi Chemical Polymer Nantong Co., Ltd. www.mrpn.com.cn		TYPE OF RESIN Polymethyl Methacrylate	255 256 257 258 259 262 263 264 265 266 267 270 290 2001 5203 5213 5223 5233 5253 5256 5283 5293 5303 5313 5333 5343 5363 5373 5363 5373 5383 5383 5393 5413 5310 53100 53150 53110 53120 53130 53137 53140 53150 53155 53168 53170 53175 53178 53180 53183 53185	Yellow Ye
			53187	Gray

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi Chemical Polymer Nantong Co., Ltd. www.mrpn.com.cn	ACRYPET VE ACRYPET VH ACRYPET VH4 ACRYPET VHM ACRYPET VHS ACRYPET VG ACRYPET ZVH SHINKOLITE P VE SHINKOLITE P VH SHINKOLITE P VH	Polymethyl Methacrylate	53190 54107 54110 54112 54115 54118 54120 54130 54132 54133 54135 54140 54145 54145 54160 54165 54170	Gray Gray Gray Gray Gray Gray Gray Gray

Coated Mitsubishi Chemical Polymer Nantong Co., Ltd. plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

FUJIHARD HH3012U-5, FUJIHARD HH3012U-6, FUJIHARD HH3012U-7, FUJIHARD HH3012U-8, FUJIHARD HH3012U-9, and FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3,: See Fujikura Kasei Co Ltd.

SH-61: See Stanley Electric Co., Ltd.

Coating Manufacturer in Alphabetical Order



Information on FUJIHARD HH3012U-5, FUJIHARD HH3012U-6, FUJIHARD HH3012U-7, FUJIHARD HH3012U-8, FUJIHARD HH3012U-9, and FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3, coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH3012U-5, FUJIHARD HH3012U-6, FUJIHARD HH3012U-7, FUJIHARD HH3012U-8, FUJIHARD HH3012U-9, and FUJIHARD HH3035U, FUJIHARD HH3035U-1, FUJIHARD HH3035U-2, FUJIHARD HH3035U-3, for use only on Acrypet VH grades.

(Coating information continued on the next page.)

TRADE NAME AND MFR. FLOW FORMULATION TYPE OF RESIN NUMBER COLOR

Information on SH-61 hard coat may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku Meguro-Ku, Tokyo 153, Japan www.stanley.co.jp

Note: Stanley SH-61 was only tested on Acrypet VH 001

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi Engineering Plastics Corporation www.m-ep.co	IUPILON ML-100 IUPILON ML-200 IUPILON ML-300 IUPILON ML-300AH IUPILON ML-350 IUPILON ML-400 IUPILON ML-100R IUPILON ML-200R IUPILON ML-300R IUPILON ML-350R IUPILON ML-350R IUPILON HL-3503 IUPILON HL-3503	Polycarbonate	001 0001 R591A R530B R591B R591C R591S 101 H101T 102 103 104 R138J 1001 1002 301	Clear # Clear # Clear #! Clear # Clear # Clear # Clear # Red #
Note:	ML-300/R1GYH, ML-300/R1BWH, ML-300/R265E, ML-400R/R206F, HL-3003/N418, HL-3003/N424, HL HL-3503/N414, HL-3503/N428 and HL-3503/N428 for protected applications only All Mitsubishi Engineering protecte were tested behind clear coated M	HL-3003/N414, -3003/N428 -3503/N424, R are	ML-300/R1GYH ML-300/R1BWH ML-400/R148A ML-300/R265E ML-400R/R206F HL-3003/N414 HL-3003/N424 HL-3003/N428 HL-3503/N418 HL-3503/N418 HL-3503/N424 HL-3503/N428 HL-3503/N428	Red! Red! Red! Yellow! Yellow! Clear!

Coated Mitsubishi Engineering Plastics Corp. Iupilon plastics may only be treated with the following coatings listed below.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-503, Acryking PH-511, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-750, Acryking PH-800, Acryking PH-800N5A, and Acryking PH-930: See Mitsubishi Chemical Corporation

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2561U-3: See Fujikura Kasei

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei

(Coating information continued on the next page)

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

NUMBER

COLOR

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei

FUJIHARD HH3372U: See Fujikura Kasei

FUJIHARD HH3401U: See Fujikura Kasei

FUJIHARD HH3482U: See Fujikura Kasei

IUPILON Coat UV: See Mitsubishi Engineering Plastics Corp.

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

MODIHARD 200S: See NOF Corpration

PHC587C, PHC587C2: See Momentive Performance Materials Inc.

PHOLUCID No.180C and 185C: See Chugoku Marine Paints Ltd..

SH-41, SH-50, SH-51 and SH-61: See Stanley Electric

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60: See Momentive Performance Materials Inc.

UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVHC8100: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5, : See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

Coating Manufacturer in Alphabetical Order



Information on PHOLUCID No.180C and 185C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971 Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No.180C was tested on lupilon ML-300AH R591C Clear and ML-300 R591B Clear only.

Note: PHOLUCID No.185C was tested on Iupilon ML-300AH R591C Clear only.



Information on FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2. FUJIHARD HH2551U. FUJIHARD HH2551U-1. FUJIHARD HH2551U-2. FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2. FUJIHARD HH3372U. FUJIHARD HH3401U and FUJIHARD HH3482U coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH2540U series, HH2551U series, HH2561U series and HH2570U series were tested on ML-

300 clear only

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Note: FUJIHARD HH3372U and FUJIHARD HH3401U were tested on ML-300 and ML-350 clear only.



Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000 and KUV-6000 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Information on IUPILON COAT UV may be obtained by writing to the following address:

Mitsubishi Engineering Plastics Corp. Plastics Sales Department 5-2, Marunouchi 2-Chome Chiyoda-Ku, Tokyo Japan www.m-ep.co.jp



MITSUBISHI Information on Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-503, Acryking PH-511, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-750, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following company:

> Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking PH-503, PH-511, PH-700, PH-710, Acryking PH-720, PH-750, Acryking PH-800 and Acryking PH-

800N5A were tested on ML-300 clear only

Note: Acryking PH-930 was tested on clear ML-300 and ML-350 only.



Information on PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2 and UVHC8100 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7

51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC3000K, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60 only tested on lupilon ML-300 / ML-350

Note: UVHC3000 only tested on Jupilon ML-350

Note: UVHC8100 was tested on Clear ML-300 and ML-350



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on lupilon ML-300 and ML-350 clear.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome, Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on ML-300 Clear in thicknesses 2.3-6.4 mm only

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

<u>NUMBER</u>

COLOR

Information on Stanley Electric SH-41, SH-50, SH-51 and SH-61 may be obtained by writing to the following company:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: SH-41 may be used be used in front of a reflex reflector. Material would have code Q

Note: Stanley SH-51 and SH-61 only tested on clear IUPILON ML-300



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Information on UVT200V1, UVT200V2, UVT200V3 and UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 is only acceptable on clear ML-300 and ML-350

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi Engineering- Plastics Corporation www.m-ep.co.jp	IUPILON ML-100 IUPILON ML-200 IUPILON ML-300 IUPILON ML-400 IUPILON ML-500 IUPILON ML-100R IUPILON ML-200R IUPILON ML-300R IUPILON ML-400R IUPILON ML-500R (coated or uncoated)	Polycarbonate	001 H5102 R5RSE R5RSE R5QTE R5RZE R5GSF R5KYH R329K R166J H2059 A6067 R525A R456J R526A T689R A6067 105 302 501 R5YNH	Clear \$ Clear
			1.011111	Ciay Cillone ψ.

Coated Mitsubishi Engineering-Plastics Corp. plastics may only be treated with the following acceptable coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-750, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930: See Mitsubishi Chemical Corporation

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2561U-3: See Fujikura Kasei

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei

FUJIHARD HH3372U: See Fujikura Kasei

FUJIHARD HH3401U: See Fujikura Kasei

FUJIHARD HH3482U: See Fujikura Kasei

IUPILON COAT UV: See Mitsubishi Engineering Plastics Corp.

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MODIHARD 200S: See NOF Corporation

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

(Coating information continued on the next page)

SH-41, SH-50, SH-51 and SH-61: See Stanley Electric

PHOLUCID No.180C: See Chugoku Marine Paints Ltd.

UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance

Materials

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UVHC8100: See Momentive Performance Materials

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

Coating Manufacturer in Alphabetical Order



Information on PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6. Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan Telephone: 81-3-3506-3971

Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No.180C was tested on Iupilon ML-300 R591B clear only.



Information on: FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2, FUJIHARD HH3372U FUJIHARD HH3401U and FUJIHARD HH3482U coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH2540U series, HH2551U series, HH2561U series and HH2570U series were tested on ML-

300 clear only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U were tested on ML-300 and ML-350 clear only.

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(Coating information continued on the next page)

TYPE OF RESIN



Information on UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Materials Inc. Building V7 51368 Leverkusen Germany Momentive Performance 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on ML-300 clear only.

Information on IUPILON COAT UV may be obtained by writing to the following address:

Mitsubishi Engineering Plastics Corp. Plastics Sales Department 5-2, Marunouchi 2-Chome Chiyoda-Ku, Tokyo, Japan www.m-ep.co.jp



Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking PH-700, PH-710, Acryking PH-720, PH-750 Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 were tested on clear ML-300 only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on lupilon ML-300 and ML-350 clear.



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Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome, Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on ML-300 Clear in thicknesses 2.3-6.4 mm only



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 is only acceptable on clear ML-300 and ML-350 Information on Stanley Electric SH-41, SH-50, SH-51 and SH-61 may be obtained by writing to the following company:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: SH-41 may be used be used in front of a reflex reflector. Material would have code Q

Note: Stanley SH-51 and SH-61 only tested on clear IUPILON ML-300

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi Engineering- Plastics Corporation www.m-ep.co.jp	NOVAREX 7022L1 NOVAREX 7022L2 NOVAREX 7022L3 (coated or uncoated)	Polycarbonate	R111 R112 R212 R213 R311 R312 R313 A114 A115 A212 A213 A306 A307 A308	Clear \$ Red \$ Yellow \$
			A411 A412	Yellow \$ Yellow \$

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Mitsubishi Gas Chemical Engineering- Plastics (Shanghai) Co. Ltd. www.m-ep.co.	IUPILON ML-100 IUPILON ML-200 IUPILON ML-300 IUPILON ML-300AH IUPILON ML-350 IUPILON ML-400 IUPILON ML-100R IUPILON ML-200R IUPILON ML-300R IUPILON ML-350R IUPILON ML-350R IUPILON ML-400R IUPILON HL-3003 IUPILON HL-3503	Polycarbonate	001 0001 R591A R530B R591B R591C R591S 101 102 103 104 R138J 1001 1002 301 3001	Clear # Red # Yellow # Yellow #
	ML-300/R1GYH, ML-300/R1BWH ML-300/R265E, ML-400R/R206F, HL-3003/N418, HL-3503/N418 HL-3503/N418 HL-3503/N428 are for protected a All Mitsubishi Engineering protect were tested behind clear coated M	HL-3003/N414, L-3003/N428 L-3503/N424, and applications only ed application materials	ML-300/R1GYH ML-300/R1BWH ML-400/R148A ML-300/R265E ML-400R/R206F HL-3003/N414 HL-3003/N424 HL-3003/N428 HL-3503/N414 HL-3503/N418 HL-3503/N424 HL-3503/N424	Red! Red! Red! Yellow! Yellow! Clear! Clear! Clear! Clear! Clear! Clear! Clear! Clear!

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Coated Mitsubishi Gas Chemical Engineering Plastics (Shanghai) Co. Ltd. lupilon plastics may only be treated with the following coatings listed below.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-503, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-750, Acryking PH-800, Acryking PH-800N5A, and Acryking PH-930: See Mitsubishi Chemical Corporation

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2561U-3: See Fujikura Kasei

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei

TRADE NAME AND MFR. FLOW FORMULATION TYPE OF RESIN NUMBER COLOR

FUJIHARD HH3372U: See Fujikura Kasei

FUJIHARD HH3401U: See Fujikura Kasei

FUJIHARD HH3482U: See Fujikura Kasei

IUPILON Coat UV: See Mitsubishi Engineering Plastics Corp.

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHC587C, PHC587C2: See Momentive Performance Materials Inc.

PHOLUCID No.180C, 185C: See Chugoku Marine Paints Ltd..

SH-41, SH-50, and SH-51: See Stanley Electric

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60: See Momentive Performance Materials Inc.

UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVHC8100: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5, : See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

Coating Manufacturer in Alphabetical Order



Information on PHOLUCID No.180C and 185C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan Telephone: 81-3-3506-3971

Telephone: 81-3-3506-3971 Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No.180C was tested on Iupilon ML-300AH R591C and Iupilon ML-300 R591B clear only.

Note: PHOLUCID No.185C was tested on lupilon ML-300AH R591C Clear only



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Information on FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2. FUJIHARD HH2551U. FUJIHARD HH2551U-1. FUJIHARD HH2551U-2. FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2. FUJIHARD HH3372U. FUJIHARD HH3401U and FUJIHARD HH3482U coatings may be obtained by writing to the following address:

TYPE OF RESIN

Fuiikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH2540U series, HH2551U series, HH2561U series and HH2570U series were tested on ML-300 clear only.

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on ML-300 and ML-350 clear only.



Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000 and KUV-6000 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si Gyunggi-Do, South Korea www.kccworld.co.kr

Information on IUPILON COAT UV may be obtained by writing to the following address:

Mitsubishi Engineering Plastics Corp. Plastics Sales Department 5-2, Marunouchi 2-Chome Chiyoda-Ku, Tokyo Japan www.m-ep.co.jp



Information on Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-503, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-750, Acryking PH-800, Acryking PH-800N5A, and Acryking PH-930 coatings may be obtained by writing to the following company:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking PH-503, PH-700, PH-710, Acryking PH-720, PH-750, Acryking PH-800 and Acryking PH-

800N5A were tested on ML-300 clear only

Note: Acryking PH-930 was tested on clear ML-300 and MI-350



Information on PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2 and UVHC8100 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Materials Inc. Building V7 51368 Leverkusen Germany Momentive Performance 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC3000K, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60 only tested on lupilon ML-300 / ML-

350

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Note: UVHC3000 only tested on Iupilon ML-350

Note: UVHC8100 was tested on clear lupilon ML-300 and lupilon ML-350



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan Phone: +81-72-857-5530

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on lupilon ML-300 and ML-350 clear.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome, Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on ML-300 Clear in thicknesses 2.3-6.4 mm only



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Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 is only acceptable on clear ML-300 and ML-350

Information on Stanley Electric SH-41, SH-50 and SH-51 may be obtained by writing to the following company:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: SH-41 may be used be used in front of a reflex reflector. Material would have code Q

Note: Stanley SH-51 only tested on clear IUPILON ML-300

Mitsubishi	IUPILON ML-100	Polycarbonate	001	Clear \$
Gas Chemical	IUPILON ML-200	•	H5102	Clear \$
Engineering-	IUPILON ML-300		R5RSE	Clear \$
Plastics	IUPILON ML-400		R5QTE	Clear \$
(Shanghai)	IUPILON ML-500		R5RZE	Clear \$
Co. Ltd.	IUPILON ML-100R		R5GSF	Clear \$
	IUPILON ML-200R		R5KYH	Clear \$
www.m-ep.co.jp	IUPILON ML-300R		R329K	Clear \$
	IUPILON ML-400R		R166J	Clear \$
	IUPILON ML-500R		H2059	Clear \$
	(coated or uncoated)		A6067	Clear \$
			R525A	Clear \$
			R456J	Clear \$
			R526A	Clear \$
			T689R	Clear \$
			A6067	Clear \$
			105	Red \$
	•		302	Yellow \$
			501	Gray Smoke \$
			R5YNH	Gray Smoke \$

Coated Mitsubishi Gas Chemical Engineering Plastics (Shanghai) Co. Ltd. plastics may only be treated with the following coatings applied to the molded lens:

MFR.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-750, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930: See Mitsubishi Chemical Corporation

FUJIHARD HH2540U, HH2540U-1, HH2540U-2: See Fujikura Kasei.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2561U-3: See Fujikura Kasei

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei

(Coating information continued on the next page)

FUJIHARD HH3372U: See Fujikura Kasei

FUJIHARD HH3401U: See Fujikura Kasei

FUJIHARD HH3482U: See Fujikura Kasei

IUPILON COAT UV: See Mitsubishi Engineering Plastics Corp.

MODIHARD 200S: See NOF Corporation.

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHOLUCID No.180C: See Chugoku Marine Paints Ltd...

UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials

UVHC8100: See Momentive Performance Materials

UVT200V1, UVT200V2, UVT200V3 and UVT200V5; See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

Coating Manufacturer in Alphabetical Order



Information on PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan Telephone: 81-3-3506-3971

Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No.180C was tested on lupilon ML-300 R591B clear only.



Information on: FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH2540U series, HH2551U series, HH2561U series and HH2570U series were tested on ML-

300 clear only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on ML-300 and ML-

350 clear only.



Information on UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany

Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on ML-300 clear only

Note: UVHC8100 was tested on clear lupilon ML-300 and lupilon ML-350

Information on IUPILON COAT UV may be obtained by writing to the following address:

Mitsubishi Engineering Plastics Corp. Plastics Sales Department 5-2, Marunouchi 2-Chome Chiyoda-Ku, Tokyo Japan www.m-ep.co.jp



MFR.

Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-800, Acryking PH-800N5A, and Acryking PH-930 may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking PH-700, PH-710, Acryking PH-720, PH-750 Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 were tested on clear ML-300 only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on lupilon ML-300 and ML-350 clear.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on ML-300 Clear in thicknesses 2.3-6.4 mm only

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

<u>NUMBER</u>

COLOR



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 is only acceptable on clear ML-300 and ML-350

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR



ACRYVIEWA

Polymethyl Methacrylate

RM-104-U1

Clear

Nippon Shokubai Co., Ltd.

www.shokubai.co.jp

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Novacel Co., Ltd. https://novacel.co.j	Cevian N 080W p/	Styrene/ Acrylonitrile	01042 1Z026 1Z027 2Z010 2Z011 2Z012 2Z013 20385 20388	Red Red Red Yellow Yellow Yellow Yellow Yellow Yellow

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Real Weathering Test Solutions

DEPLOYING PRECISION AND SPEED FOR REAL-WORLD RESULTS





elements climate environment

SAE J 576 TESTING

AZTEST provides SAE J576 compliant testing services to meet automotive plastic lens material requirements as required by the Federal Motor Vehicle Safety Standard No. 571.108.

SAE J576 also allows accelerated testing in accordance with ASTM D 4364. This standard is based on ASTM Standard G 90, "Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight."

Accelerated and Natural Arizona and Florida Weathering tests are available, including all the required instrumental measurement and visual evaluations.

Federal Motor Vehicle Safety Standard No. 571.108, Lamps, Reflective Devices, and Associated Equipment requires the following tests:

TEST	REQUIREMENT
Material Thickness	Required thickness 1.6 mm, 2.3 mm, 3.2 mm, 6.4 mm
Heat Test	2 hours in circulating oven at 79 \pm 3° C
Outdoor Weathering	3 years Arizona and Florida — SAE J576
Haze	After weathering, haze cannot exceed 30% as measured by ASTM D1003 for plastic materials used for outer lenses; 7% for plastic materials used as reflex reflectors or for lenses used in front of reflex reflectors.
Luminous Transmittance	After weathering, the luminous transmittance measured in accordance with ASTM E308 shall not have changed more than 25% compared to unexposed measurements.
Color	Must meet SAE J578 color specification before and after weathering
Visual Evaluations	After weathering, must not have color bleeding, delamination, crazing, or cracking. Materials used for reflex reflectors and for materials used in front of reflex materials must not have surface deterioration or dimensional changes.
Minimum number of specimens per material, coating and color type	20 specimens (Five of each thickness).





As an A2LA and AMECA accredited lab, AZTEST can perform all weathering tests required by AMECA and SAE specifications related to automotive lighting lens materials.



How To Order

Contact AZTEST Customer Service at wsales@aztest.com for more information on how AZTEST can meet your specific test requirements. The sales team will provide guidance on how to create a test, ship your samples and set parameters to evaluate products.

TO CREATE AN ORDER:

- Go to www.aztest.com
- Click on "Download" at the top of the home page
- Select "Order Forms" from the drop down menu
- Select order form format
- Complete and submit to wsales@aztest.com

GUIDELINES FOR ORDERING, PACKING AND SHIPPING*:

From US locations—

- Carefully package test samples for shipment
- Non-fabric specimens should be wrapped in a soft paper product (we recommend Kimtech Kimwipes Delicate Task Wipers)
- Do not use newspaper
- Wrap entire package in bubble wrap and secure with tape
- Place package in sturdy box or container and fill gaps with packing material

From international locations—

- Follow US location packaging instructions above
- Complete a Commercial Invoice to accompany samples
- Assign a \$1.00 value on shipping documents (we recommend sample description as follows: "Test Samples. No Commercial Value")

*INSTRUCTIONS ALSO AVAILABLE AT www.AZTEST.com

SEND PACKAGED SPECIMENS, ORDER FORM (**OPIIONAL**) AND PURCHASE ORDER TO:

Arizona Desert Testing LLC

21212 West Patton Road Wittmann, Arizona 85361 USA

To contact AZTEST:

call: +1-623-388-9500 fax: +1-623-388-9007 e-mail: wsales@aztest.com visit: www.aztest.com

write: 21212 West Patton Road Wittmann, Arizona 85361 USA

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Plaskolite, Inc. www.plaskolite.com	CA-61 CA-75 CA-82 CA-924 CA-927 CA-1000E CA-1000I CP-61 CP-71 CP-75 CP-82 CP-86 CP-86 CP-86 UVA CP-924 CP-927 CP-1000E CP-1000I	Polymethyl Methacrylate	RD 01 RD 03 RD 05 RD 10 RD 80 RD 110 RD 114 RD 125 RD 126 RD 128 RD 128 RD 145 RD 180 RD 181 RD 187 RD 188 RD 189 RD 190 RD 191 RD 192 RD 195 YL 07 YL 12 YL 48 YL 64 YL 87 YL 90 YL 91 YL 99 YL 102 YL 130 YL 131 YL 133 YL 198 BL 35 BL 92 BL 142 GY 58102 GY 58240 GY 58240	Clear Red

Plaskolite, PL-30 MS983 Methacrylate NC 10 Clear RD 01 Red RD 03 Red RD 05 Red RD 05 Red RD 06 Red RD 08 Red RD 100 Red RD 100 Red RD 100 Red RD 100 Red RD 110 Red RD 117 Red RD 117 Red RD 117 Red RD 128 Red RD 128 Red RD 128 Red RD 128 Red RD 145 Red RD 145 Red RD 145 Red RD 145 Red RD 147 Red RD 180 Red RD 180 Red RD 180 Red RD 181 Red RD 180 Red RD 181 Red RD 180 Red RD 181 Red RD 181 Red RD 181 Red RD 189 Red RD 189 Red RD 189 Red RD 190 Red RD 191 Red RD 191 Red RD 192 Red RD 194 Red RD 194	MER.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
CV 58240 Cray	Inc.	MS983	Polymethyl Methacrylate	RD 01 RD 03 RD 05 RD 10 RD 80 RD 110 RD 114 RD 117 RD 125 RD 126 RD 128 RD 145 RD 169 RD 171 RD 176 RD 180 RD 181 RD 187 RD 188 RD 189 RD 190 RD 191 RD 192 RD 195 YL 07 YL 12 YL 48 YL 64 YL 87 YL 90 YL 130 YL 131 YL 133 YL 133 YL 133 YL 134 GY 58102	Clear Red

Gray 7V274 7V275 7V273 7V271 7V272 7V270 7V269 7V268 7V265 7V205 7V336 7V337 7V338 7V244 75451 77670



TRADITIONALLY INNOVATIVE

MFR.

Roehm America LLC Röhm GmbH Roehm Chemical (Shanghai) Co., Ltd

www.roehm.com http://www.acrylitepolymers.com/ www.Plexiglas.de

(Was Evonik)

PMMA 7M 0000 ACRYLITE®/ PLEXIGLAS® 7H 0011 unmodified base resins 8N 8H Neutral 543A PMMA ACRYLITE®/ PLEXIGLAS® HT Yellow			Clear
PMMA		7N	
PMMA			000
ACRYLITE® PLEXIGLAS®			
Unmodified base resins			
Neutral 543A 543A	unmodified base resins		
PMMA ACRYLITE®/ PLEXIGLAS® Optical Optical PMMA ACRYLITE®/ PLEXIGLAS® PMMA ACRYLITE®/ PLEXIGLAS® ACRYLITE®/ PLEXIGLAS® ProTerra AG100 AG100 L02 BN plus 2X4BR 23340 2x4BR 23335 2x6BR 23335 2x6BR 23335 2x6BR 23335 2x6BR 23335 2x6BR 23315 ACRYLITE®/ PLEXIGLAS® 2x40 Resist (impact modified) grades 2x40 2x40 Red 2x3BR 2x4HC 2x4BR 2x3BR 2x4HC 3x136 2x4HC 3x136 2x4HC 3x136 2x4HC 3x136 3x681 3x137 2x4HC 3x136 3x681 3x137 2x4HC 3x136 3x681 3x137 2x4HC 3x136 3x681 3x137 2x4HC 3x136 3x681 3x121 PMMA ACRYLITE®/ PLEXIGLAS® ACRYLITE®/ PLEXIGLAS® ACRYLITE®/ PLEXIGLAS® ACRYLITE®/ PLEXIGLAS® ACRYLITE®/ PLEXIGLAS® ACRYLITE®/ PLEXIGLAS® BN LD12 PMMA for edge lighting ACRYLITE®/ PLEXIGLAS® BN LD12 PMMA for edge lighting ACRYLITE®/ PLEXIGLAS® BN LD14 ACRYLITE®/ PLEXIGLAS® BN LD24 ACRYLITE®/ PLEXIGLAS® BN LD96 Note: 8N LD12 cannot be used on or in for of a reflex reflector Front of a reflex reflector		÷	Neutral
PMMA		011	543A
ACRYLITE®/ PLEXIGLAS®	PMMA		0.671
Optical	ACRYLITE®/ PLEXIGLAS®	HT	Yellow
PMMA	Optical		13025
ACRYLITE®/ PLEXIGLAS® 8N proTerra AG100 LO2 8N plus 23340 2x4BR 23095 2x5BR 23335 2x6BR 13115 PMMA 2x6 2x60 2v401 Resist 2x30 115 (impact modified) grades 2x40 2x4HC 2x5BR 2x130 115 (impact modified) grades 2x40 2x4HC 2x5HT 2x6HT 3v125 2x5HT 2x5HT 2x5	•		
Description		8N	
AG100 L02 8N plus 2x4BR 23340 2k4BR 23335 2k5BR 23335 2k6BR 13115 PMMA ACRYLITE®/ PLEXIGLAS® 2k40 (impact modified) grades 2k40 2k3BR 2k3BR 2k4HC 2k5HT 2k6HT 3v126 2k5HT 2k6HT 3v126 2k5HT 3v126 2k5HT 3v126 2k5HT 3v126 2k5HT 3v126 33861 PMMA ACRYLITE®/ PLEXIGLAS® ACRYLITE®/ PLEXIGLAS® ACRYLITE®/ PLEXIGLAS® ACRYLITE®/ PLEXIGLAS® FT15 PMMI ACRYMID® PLEXIMID® 8N LD12 PMMA for edge lighting ACRYLITE®/ PLEXIGLAS® 8N LD12 PMMA for edge lighting 8N LD12 PMMA for edge lighting 8N LD24 ACRYLITE®/ PLEXIGLAS® 8N LD48 Edgelight Note: 8N LD12 cannot be used on or in front of a reflex reflector		011	
AG100 L02 8N plus 2344BR 23340 2k4BR 23395 2k5BR 23335 2k6BR 13115 PMMA 2k6 ACRYLITE®/ PLEXIGLAS®	provend	AG100	
SN plus			Amhar
Zk4BR Z3095 Zk5BR Z45BR Z3335 Zk6BR Z45BR Z3335 Zk6BR Z46BR Z46BR Z46BR Z420 Z4			
Zk5BR Zk6BR 13115			
PMMA			
PMMA			
ACRYLITE®/ PLEXIGLAS® zk30 115 (impact modified) grades zk40	DNANAA		
Resist (impact modified) grades			
(impact modified) grades zk40 zkM Red zk3BR 3V137 zk4HC 3V136 zk5HT 3V126 zk6HT 3V125 33661 33681 ACRYLITE®/ PLEXIGLAS® FT15 Heatresist FT15 PMMI 33721 ACRYMID® TT50 PLEXIMID® 33701 PLEXIMID® 3V401 3V401 3V402 PMMA for edge lighting 8N LD12 ACRYLITE®/ PLEXIGLAS® 8N LD48 Edgelight 8N LD48 Redgelight 8N LD96 Note: 8N LD12 cannot be used on or in front of a reflex reflector Green			
ZkM Zk3BR 3V137 Zk4HC 3V136 Zk5HT 3V126 Zk5HT 3V126 Zk6HT 3V125 Zk6HT 33661 Zk6HT 33661 Zk6HT 33780(901) Zk6HT Zk6HT 33780(901) Zk6HT Zk6H	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		115
Zk3BR Zk4HC 3V136 Zk5HT 3V126 Zk5HT Zk6HT 3V126 Zk6HT Zk6HT 3V125 Zk6HT 33661 Zk6HT 33661 Zk6HT 33661 Zk6HT 33661 Zk6HT 33661 Zk6HT 33661 Zk6HT Zk6H	(impact modified) grades		Pod
Zk4HC Zk5HT 3V126 Zk5HT 3V126 Zk6HT Zk6HT 3V125 Zk6HT 3V125 Zk6HT 3S661 Zk6HT 3S661 Zk6HT 3S661 Zk6HT 3S661 Zk6HT Zk6H			
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Zk6HT 3V125 33661			
33661 PMMA			* * * * * * * * * * * * * * * * * * * *
PMMA 33681 ACRYLITE®/ PLEXIGLAS® hw55 Heatresist FT15 PMMI 33721 ACRYMID® TT50 PLEXIMID® 33701 8N LD12 3V401 PMMA for edge lighting 8N LD24 ACRYLITE®/ PLEXIGLAS® 8N LD48 Edgelight 8N LD96 Note: 8N LD12 cannot be used on or in front of a reflex reflector Green		ZKOTI	
ACRYLITE®/ PLEXIGLAS®	DMANAA		
Heatresist		hw55	
PMMI ACRYMID® 33711 PLEXIMID® 33701 PLEXIMID® 33691 3V401 3V402 PMMA for edge lighting 8N LD24 ACRYLITE®/ PLEXIGLAS® 8N LD48 Edgelight 8N LD96 Note: 8N LD12 cannot be used on or in front of a reflex reflector Green		FT15	
ACRYMID® TT50 PLEXIMID® 33701 33691 3V401 8N LD12 3V402 PMMA for edge lighting 8N LD24 3V403 ACRYLITE®/ PLEXIGLAS® 8N LD48 Edgelight 8N LD96 Note: 8N LD12 cannot be used on or in front of a reflex reflector 65122			
SN LD12 33691 3V401 3V402 3V402 2V402 2V402 2V402 2V403 2V	1 1111111	TTCO	
3V401 8N LD12 3V402		1150	
8N LD12 3V402 PMMA for edge lighting 8N LD24 3V403 ACRYLITE®/ PLEXIGLAS® 8N LD48 Edgelight 8N LD96 Note: 8N LD12 cannot be used on or in front of a reflex reflector 65122	PLEAIMID		
PMMA for edge lighting 8N LD24 ACRYLITE®/ PLEXIGLAS® 8N LD48 Edgelight 8N LD96 Note: 8N LD12 cannot be used on or in front of a reflex reflector 65122		0N L D40	
ACRYLITE®/ PLEXIGLAS® 8N LD48 Edgelight 8N LD96 Note: 8N LD12 cannot be used on or in front of a reflex reflector 65122	DAMAA Cook Loo Policion		
Edgelight 8N LD96 Note: 8N LD12 cannot be used on or in front of a reflex reflector 65122			
Note: 8N LD12 cannot be used on or in front of a reflex reflector 65122			3V408
front of a reflex reflector 65122			
	_		
05542	front	or a reflex reflector	
] 65542

MFR. POLYMER BASE PRODUCT NAME COLOUR-CODE

7V244

Coated Roehm plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

PHC XH100P: See Momentive Materials

Coating Manufacturer in Alphabetical Order



Information on PHC XH100P hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: PHC XH100P tested on Acrylite Resist AG100 clear only

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
	LEXAN® LS-1	Polycarbonate	111	White #!
سيانك	LEXAN® LS-1A		111C	White #!
1.	LEXAN® LS-2		111H	White #!
<u>ح</u> طاله ک	LEXAN® LS-2A		111J	White #!
	LEXAN® LS-3		111M	White #!
	LEXAN® LSHF (HIGH FLOW)	111S	White #!
Sabic USA	(coated or uncoated)		112	White #!
			51073	Smoke Grey #!
www.sabic.com			71127	Smoke Grey #!
			71194	Smoke Grey #!
•			71274 GY3A578T	Smoke Grey #!
			6111	Smoke Grey #! Red #!
			6162	Red #!
			6164	Red #!
			61014	Red #!
			61079	Red #!
			61228	Red #!
			414	Yellow #!
			4135	Yellow #!
			4158	Yellow #!
			4168	Yellow #!
			4169	Yellow #!
			4173	Yellow #!
			4194	Yellow #!
			41105	Yellow #!
			41152	Yellow #!
			YW 5005T	Yellow #!
			21242	Clear Blue #!
			2148	Clear Blue #!

Note: LEXAN® Protected Applications were tested behind Coated LS-2-111 Clear

Coated Sabic USA plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings: See Mitsubishi Chemical Corporation

FUJIHARD 2500: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei Co., Ltd.

MFR.

FUJIHARD HH3401U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei Co., Ltd.

FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, FUJISOFT 2604 coatings: See Fujikura Kasei Co., Ltd.

KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100: See KCC Corporation

LHP100/LHC100, LHP100/AS4000; See Momentive Performance Materials Inc.

MODIHARD 200S: See NOF Corporation

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHOLUCID No. 130C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

PHC200, PHC587, PHC587B, PHC587C, PHC587C2: See Momentive Performance Materials Inc.

RayGloss 402: See BASF Coatings GmbH

SH-2, SH-41, SH-50 and SH-51: See Stanley Electric Co., Ltd.

SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000: See Momentive Performance Materials Inc.

UVHC3000C, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

X-48-5500-A18: See Shin-Etsu Chemical Co., Ltd.

Coating Manufacturer in Alphabetical Order



Information on RayGloss 402 coatings may be obtained by writing:

BASF Coatings GmbH ECO/DT - C422 D-48165 Muenster Germany www.basf-coatings.com



Information on PHOLUCID No. 130C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971 Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No. 130C and PHOLUCID No.180C were tested on Sabic LS-1 111 and Sabic LS-1 111J and Sabic LS-1 111J clear only.



Information on FUJIHARD 2500, FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2566U, UJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3, FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2570U,

FUJIHARD HH2570U-1, FUJIHARD HH2570U-2, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, and FUJISOFT 2604 coatings may be obtained by writing to the following address:

> Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJISOFT 2601 may NOT be used on lenses incorporating a reflex reflector or in front of a reflex reflector.

Note: FUJIHARD HH2566U-series and HH2567U-series were tested on clear lenses only.

Note: FUJIHARD HH2540U-series, FUJIHARD HH2570U-series, FUJIHARD HH2561U-series and FUJIHARD

HH9986U-series were tested on clear LS-2 plastics only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on LS-1 111 and LS-2

111 only.

MFR.

TRADE NAME AND **FLOW FORMULATION**

TYPE OF RESIN

NUMBER

COLOR



Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000 and KUV-9100 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Note: KUV-3000, KUV-4000, KUV-5000, KUV-6000, and KUV-9100 were tested on Sabic LS1-111 and LS2-111

clear only.

Note: KUV-1000, and KUV-2000 is suitable for over 6.4 mm LS2-111 clear lenses only.



MITSUBISHI Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503. Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following address:

> Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 www.m-chemical.co.jp

Note: Acryking PH-350 was tested on LS-2 with clear lenses only

Note: Acryking PH-710 and Acryking PH-720 were tested on LS-1 and LS-2 with clear lenses only

Note: Acryking PH-511, Acryking PH-700, Acryking PH-800 and Acryking PH-800N5A were tested on LS-1-111

and LS-2-111

Note: LS-1-111J was tested with Acryking PH-710, Acryking PH-720, and Acryking PH-800 only.

Note: Acryking PH-930 was tested on Clear LS-1 111 and LS-2 111 only



Information on LHP100/LHC100, LHP100/AS4000, SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000, PHC200, PHC587, PHC587B, PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50,

UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

> Momentive Performance Materials GmbH **Building V7** 51368 Leverkusen Germany

Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on LS1 and LS2 clear only



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on SABIC LS-1 111 Clear in thicknesses 1.6 and 6.4 mm only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd.

2-14-1 Shodai-Ohtani

Hirakata-City, Osaka 573-1153

Japan

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on Lexan LS1-111 and LS2-111.



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coating may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested on clear LS-1, and LS-2



Shift Information of X-48-5500-A18 hard coat may be obtained by writing to the following address:

Shin-Etsu Chemical Co., Ltd. 4-1, Marunouchi 1-Chome Chiyoda-ku, Tokyo 100-0005, Japan www.shinetsu.co.jp

Note: X-48-5500-A18 was tested on SABIC LS1 clear only.

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

<u>NUMBER</u>

COLOR

Information on SH-2, SH-41, SH-50 and SH-51 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153, Japan www.stanley.co.jp

Note: Stanley SH-51 tested on Sabic LS-2 clear only.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
4.1	LEXAN® LS-1	Polycarbonate	111	White #!
سانگ	LEXAN® LS-1A		111C	White #!
1.1	LEXAN® LS-2		111H	White #!
<u>ح</u> طالع	LEXAN® LS-2A		111J	White #!
	LEXAN® LS-3		111M	White #!
	LEXAN® LSHF (HIGH FLOW)		111S	White #!
Sabic Brazil	(coated or uncoated)		112	White #!
			51073	Smoke Grey #!
www.sabic.com			71127	Smoke Grey #!
			71194	Smoke Grey #!
			71274	Smoke Grey #!
			GY3A578T	Smoke Grey #!
			6111	Red #!
			6162	Red #!
			6164	Red #!
			61014	Red #!
			61079	Red #!
			61228	Red #!
			414	Yellow #!
			4135	Yellow #!
			4158	Yellow #!
			4168	Yellow #!
			4169	Yellow #!
			4173	Yellow #!
			4194	Yellow #!
			41105	Yellow #!
			41152	Yellow #!
			YW 5005T	Yellow #!
			21242	Clear Blue #!

Coated Sabic Brazil plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings: See Mitsubishi Chemical Corporation

FUJIHARD 2500: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei Co., Ltd.

MFR.

FUJIHARD HH3401U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei Co., Ltd.

FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, FUJISOFT 2604 coatings: See Fujikura Kasei Co., Ltd.

KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100: See KCC Corporation

LHP100/LHC100, LHP100/AS4000: See Momentive Performance Materials Inc.

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHOLUCID No. 130C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

PHC200, PHC587, PHC587B, PHC587C, PHC587C2: See Momentive Performance Materials Inc.

RayGloss 402: See BASF Coatings GmbH

SH-2, SH-41, SH-50 and SH-51: See Stanley Electric Co., Ltd.

SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000: See Momentive Performance Materials Inc.

UVHC3000C, UVHC3000CS, UVHC3000K, UVHC3000K1, UVHC3000K1, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

X-48-5500-A18: See Shin-Etsu Chemical Co., Ltd.

Coating Manufacturer in Alphabetical Order

Information on RayGloss 402 coatings may be obtained by writing:

TYPE OF RESIN



MFR.

BASF Coatings GmbH ECO/DT - C422 D-48165 Muenster Germany www.basf-coatings.com

Note: BASF RayGloss 402 was tested on LEXAN® LS-1 and LEXAN® LS-2 clear only.



Information on PHOLUCID No. 130C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan Telephone: 81-3-3506-3971

Facsimile: 81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No. 130C and PHOLUCID No.180C were tested on Sabic LS-1 111 and Sabic LS-1 111J and Sabic LS-1 111J clear only.



Information on FUJIHARD 2500, FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3, FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2570U, FUJIHARD HH2570U-1,

FUJIHARD HH2570U-2, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, and FUJISOFT 2604 coatings may be obtained by writing to the following address:

> Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJISOFT 2601 may NOT be used on lenses incorporating a reflex reflector or in front of a reflex reflector.

Note: FUJIHARD HH2566U-series and FUJIHARD HH2567U-series for use on clear lenses only

Note: FUJIHARD HH2540U-series, FUJIHARD HH2570U-series, FUJIHARD HH2561U-series and FUJIHARD

HH9986U-series is for use on clear LS-2 plastics only.

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on LS-1 111 and LS-2 111 only.

TRADE NAME AND **FLOW FORMULATION**

TYPE OF RESIN

NUMBER

COLOR



Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000 and KUV-9100 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Note: KUV-3000, KUV-4000, KUV-5000, KUV-6000, and KUV-9100 were tested on Sabic LS1-111 and LS2-111

clear only.

Note: KUV-1000, and KUV-2000 is suitable for over 6.4 mm LS2-111 clear lenses only.



MITSUBISHI Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503. Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following address:

> Mitsubishi Chemical Corporation 1-2 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking PH-350 was tested on LS-2 with clear lenses only

Note: Acryking PH-710 and Acryking PH-720 was tested on LS-1 and LS-2 with clear lenses only

Note: Acryking PH-511, Acryking PH-700, Acryking PH-800 and Acryking PH-800N5A was tested on LS-1-111 and

LS-2-111

Note: LS-11-111J was tested with Acryking PH-710, Acryking PH-720, and Acryking PH-800 only.

Note: Acryking PH-930 was tested on Clear LS-1 111 and LS-2 111 only



Germany

Information on LHP100/LHC100, LHP100/AS4000, SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000, PHC200, PHC587, PHC587B, PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50,

Momentive Performance Materials Inc.

UVHC3000KZ60 UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen

260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on LS1 and LS2 clear only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on Lexan LS1-111 and LS2-111.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on SABIC LS-1 111 Clear in thicknesses 1.6 and 6.4 mm only



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coating may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested on clear LS-1. and LS-2



Shifted Information of X-48-5500-A18 hard coat may be obtained by writing to the following address:

Shin-Etsu Chemical Co., Ltd. 4-1, Marunouchi 1-Chome Chiyoda-ku, Tokyo 100-0005, Japan www.shinetsu.co.jp

Note: X-48-5500-A18 was tested on SABIC LS1 clear only.

Information on SH-2, SH-41, SH-50 and SH-51 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: Stanley SH-51 tested on Sabic LS-2 clear only.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
حبابک خماهند	LEXAN® LS-1 LEXAN® LS-2 LEXAN® LS-3 LEXAN® LSHF (HIGH FLOW) (coated or uncoated)	Polycarbonate	111 111H 111HX 6162 GY3A578T	White #! White #! White #! Red #! Smoke Grey #!

Sabic Chongqing China

www.sabic.com

Coated Sabic Chongging, China plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings: See Mitsubishi Chemical Corporation

FUJIHARD 2500: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei Co., Ltd.

FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, FUJISOFT 2604 coatings: See Fujikura Kasei Co., Ltd.

KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100: See KCC Corporation

LHP100/LHC100, LHP100/AS4000: See Momentive Performance Materials Inc.

MODIHARD 200S: See NOF Coatings

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHOLUCID No. 130C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

PHC200, PHC587, PHC587B, PHC587C, PHC587C2: See Momentive Performance Materials Inc.

RayGloss 402: See BASF Coatings GmbH

MFR.

SH-2, SH-41, SH-50 and SH-51: See Stanley Electric Co., Ltd.

SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000: See Momentive Performance Materials Inc.

TYPE OF RESIN

UVHC3000C, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

X-48-5500-A18: See Shin-Etsu Chemical Co., Ltd.

Coating Manufacturer in Alphabetical Order



Information on RayGloss 402 coatings may be obtained by writing:

BASF Coatings GmbH ECO/DT - C422 D-48165 Muenster Germany www.basf-coatings.com

Note: BASF RayGloss 402 was tested on LEXAN® LS-1 and LEXAN® LS-2 clear only.



Information on PHOLUCID No. 130C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan Telephone: 81-3-3506-3971 Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No. 130C and PHOLUCID No.180C were tested on Sabic LS-1 111 and Sabic LS-1 111J and Sabic LS-1 111J clear only.



Information on FUJIHARD 2500, FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2. FUJIHARD HH2551U. FUJIHARD HH2551U-1. FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3, FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD

HH2570U-2, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, and FUJISOFT 2604 coatings may be obtained by writing to the following address:

> Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJISOFT 2601 may NOT be used on lenses incorporating a reflex reflector or in front of a reflex reflector.

Note: FUJIHARD HH2566U-series and FUJIHARD HH2567U-series for use on clear lenses only

Note: FUJIHARD HH2540U-series, FUJIHARD HH2570U-series, FUJIHARD HH2561U-series and FUJIHARD

HH9986U-series is for use on clear LS-2 plastics only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on LS-1 111 and LS-2

111 only.

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Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000 and KUV-9100 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do, South Korea www.kccworld.co.kr

Note: KUV-3000, KUV-4000, KUV-5000, KUV-6000, and KUV-9100 were tested on Sabic LS1-111 and LS2-111

clear only.

Note: KUV-1000, and KUV-2000 is suitable for over 6.4 mm LS2-111 clear lenses only.



MITSUBISHI Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following address:

> Mitsubishi Chemical Corporation 1-3 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 Japan

www.m-chemical.co.jp

Note: Acryking PH-350 was tested on LS-2 with clear lenses only

Note: Acryking PH-710 and Acryking PH-720 were tested on LS-1 and LS-2 with clear lenses only

Note: Acryking PH-511, Acryking PH-700, Acryking PH-800 and Acryking PH-800N5A were tested on LS-1-111

and LS-2-111

Note: LS-1-111J was tested with Acryking PH-710, Acryking PH-720, and Acryking PH-800 only.

Note: Acryking PH-930 was tested on Clear LS-1 111 and LS-2 111 only

TYPE OF RESIN

NUMBER

COLOR



Information on LHP100/LHC100, LHP100/AS4000, SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000, PHC200, PHC587, PHC587B, PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50,

UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on LS1 and LS2 clear only



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on SABIC LS-1 111 Clear in thicknesses 1.6 and 6.4 mm only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

NIPPON PAINT AUTOMOTIVE COATINGS

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan Phone: +81-72-857-5530

Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on Lexan LS1-111 and LS2-111.



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coating may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested on clear LS-1, and LS-2



Information of X-48-5500-A18 hard coat may be obtained by writing to the following address:

Shin-Etsu Chemical Co., Ltd. 4-1, Marunouchi 1-Chome Chiyoda-ku, Tokyo 100-0005, Japan www.shinetsu.co.jp

Note: X-48-5500-A18 was tested on SABIC LS1 clear only.

Information on SH-2, SH-41, SH-50 and SH-51 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: Stanley SH-51 tested on Sabic LS-2 clear only.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
يى ايك	LEXAN® LS-1 LEXAN® LS-1A	Polycarbonate	111 111C	White #! White #!
	LEXAN® LS-2		111H	White #!
<i>ح</i> طاعات	LEXAN® LS-2A LEXAN® LS-3		111HX	White #!
			111J	White #!
	LEXAN® LSHF (HIGH FLOW) (coated or uncoated)		111M	White #!
Sabic Europe	(coated of discoated)		111S	White #!
			111X	White #!
www.sabic.com			112	White #!
			51073 71127	Smoke Grey #!
			71127 71194	Smoke Grey #! Smoke Grey #!
			71194	Smoke Grey #!
			GY3A578T	Smoke Grey #!
			6111	Red #!
			6162	Red #!
			6164	Red #!
			61014	Red #!
			61079	Red #!
			61228	Red #!
			414	Yellow #!
			4135	Yellow #!
			4158	Yellow #!
			4168	Yellow #!
			4169 4173	Yellow #! Yellow #!
			4173	Yellow #!
			41105	Yellow #!
			41152	Yellow #!
			YW 5005T	Yellow #!
			21242	Clear Blue #!
			2148	Clear Blue #!
	LEXAN® XLS 1110T Protecte		11204	Natural "!"
	LEXAN® XLS 1110 Protected		11204	Natural "!"
	LEXAN® XLS 1210 Protected	d Application Only	NA9G165T NA9H009T	Clear Blue "!" Clear Blue "!"

Note:LEXAN® Protected Applications were tested behind Coated LS-2-111 Clear Note: LS-1-111J was tested with Acryking PH-710, Acryking PH-720, and Acryking PH-800 only

Coated Sabic Europe plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings: See Mitsubishi Chemical Corporation

FUJIHARD 2500: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

TYPE OF RESIN

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei Co., Ltd.

FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, FUJISOFT 2604 coatings: See Fujikura Kasei Co., Ltd.

KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100: See KCC Corporation

LHP100/LHC100, LHP100/AS4000: See Momentive Performance Materials Inc.

MODIHARD 200S: See NOF Coatings

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHOLUCID No. 130C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

PHC200, PHC587, PHC587B, PHC587C, PHC587C2: See Momentive Performance Materials Inc.

RayGloss 402: See BASF Coatings GmbH

SH-2, SH-41, SH-50 and SH-51: See Stanley Electric Co., Ltd.

SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000: See Momentive Performance Materials Inc.

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

X-48-5500-A18: See Shin-Etsu Chemical Co., Ltd.

Coating Manufacturer in Alphabetical Order

Information on RayGloss 402 coatings may be obtained by writing:



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BASF Coatings GmbH ECO/DT - C422 D-48165 Muenster Germany www.basf-coatings.com

Note: BASF RayGloss 402 was tested on LEXAN® LS-1 and LEXAN® LS-2 clear only.



Information on PHOLUCID No. 130C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971 Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No. 130C and PHOLUCID No.180C were tested on Sabic LS-1 111 and Sabic LS-1 111J and Sabic LS-1 111J clear only.



Information on FUJIHARD 2500, FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3, FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD

HH2570U-2, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, and FUJISOFT 2604 coatings may be obtained by writing to the following address:

> Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJISOFT 2601 may NOT be used on lenses incorporating a reflex reflector or in front of a reflex reflector.

Note: FUJIHARD HH2566U-series and FUJIHARD HH2567U-series for use on clear lenses only

Note: FUJIHARD HH2540U-series, FUJIHARD HH2570U-series, FUJIHARD HH2561U-series and FUJIHARD

HH9986U-series is for use on clear LS-2 plastics only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on LS-1 111 and LS-2

111 only.

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Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000 and KUV-9100 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Note: KUV-3000, KUV-4000, KUV-5000, KUV-6000, and KUV-9100 were tested on Sabic LS1-111 and LS2-111

Note: KUV-1000, and KUV-2000 is suitable for over 6.4 mm LS2-111 clear lenses only.



MITSUBISHI Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503. Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following address:

> Mitsubishi Chemical Corporation 1-4 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 Japan

www.m-chemical.co.jp

Note: Acryking PH-350 was tested on LS-2 with clear lenses only

Note: Acryking PH-710 and Acryking PH-720 were tested on LS-1 and LS-2 with clear lenses only

Note: Acryking PH-511, Acryking PH-700, Acryking PH-800 and Acryking PH-800N5A were tested on LS-1-111

and LS-2-111

Note: LS-1-111J was tested with Acryking PH-710, Acryking PH-720, and Acryking PH-800 only.

Note: Acryking PH-930 was tested on Clear LS-1 111 and LS-2 111 only



Information on LHP100/LHC100, LHP100/AS4000, SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000, PHC200, PHC587, PHC587B, PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50,

UVHC3000KZ60 UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on LS1 and LS2 clear only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan Phone: +81-72-857-5530

Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on Lexan LS1-111 and LS2-111.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on SABIC LS-1 111 Clear in thicknesses 1.6 and 6.4 mm only



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coating may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested on clear LS-1, and LS-2



Information of X-48-5500-A18 hard coat may be obtained by writing to the following address:

Shin-Etsu Chemical Co., Ltd. 4-1, Marunouchi 1-Chome Chiyoda-ku, Tokyo 100-0005, Japan www.shinetsu.co.jp

Note: X-48-5500-A18 was tested on SABIC LS1 clear only.

Information on SH-2, SH-41, SH-50 and SH-51 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: Stanley SH-51 tested on Sabic LS-2 clear only.

MER.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
حباب خماءند	LEXAN® LS-1 Polycarbonate LEXAN® LS-1A LEXAN® LS-2 LEXAN® LS-2A (coated or uncoated)		111 111H 111X 6162 414	White #! White #! White #! Red #! Yellow #!
www.sabic.com Sabic India	(coated of unlocated)		71127 71194 71274 GY3A578T	Smoke Grey #! Smoke Grey #! Smoke Grey #! Smoke Grey #!

Note:LEXAN® Protected Applications were tested behind Coated LS-2-111 Clear

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Coated Sabic India plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings: See Mitsubishi Chemical Corporation

FUJIHARD 2500: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei Co., Ltd.

FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, FUJISOFT 2604 coatings: See Fujikura Kasei Co., Ltd.

KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100: See KCC Corporation

TRADE NAME AND MFR. FLOW FORMULATION

TYPE OF RESIN

NUMBER

COLOR

LHP100/LHC100, LHP100/AS4000: See Momentive Performance Materials Inc. MODIHARD 200S: See NOF Coatings

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHOLUCID No. 130C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

PHC200, PHC587, PHC587B, PHC587C, PHC587C2: See Momentive Performance Materials Inc.

RayGloss 402: See BASF Coatings GmbH

SH-2, SH-41, SH-50 and SH-51: See Stanley Electric Co., Ltd.

SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000: See Momentive Performance Materials Inc.

UVHC3000C, UVHC3000CS, UVHC3000K, UVHC3000K1, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

X-48-5500-A18: See Shin-Etsu Chemical Co., Ltd.

Coating Manufacturer in Alphabetical Order

Information on RayGloss 402 coatings may be obtained by writing:



BASF Coatings GmbH ECO/DT - C422 D-48165 Muenster Germany www.basf-coatings.com

Note: BASF RayGloss 402 was tested on LEXAN® LS-1 and LEXAN® LS-2 clear only.



Information on PHOLUCID No. 130C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971 Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No. 130C and PHOLUCID No.180C were tested on Sabic LS-1 111 and Sabic LS-1 111J clear only.



Information on FUJIHARD 2500, FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2566U-9, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD

HH2570U-2, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, and FUJISOFT 2604 coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJISOFT 2601 may NOT be used on lenses incorporating a reflex reflector or in front of a reflex reflector.

Note: FUJIHARD HH2566U-series and FUJIHARD HH2567U-series for use on clear lenses only

Note: FUJIHARD HH2540U-series, FUJIHARD HH2570U-series, FUJIHARD HH2561U-series and FUJIHARD

HH9986U-series is for use on clear LS-2 plastics only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on LS-1 111 and LS-2

111 only.



Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000 and KUV-6000 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Note: KUV-3000, KUV-4000, KUV-5000, KUV-6000, and KUV-9100 were tested on Sabic LS1-111 and LS2-111

clear only.

Note: KUV-1000, and KUV-2000 is suitable for over 6.4 mm LS2-111 clear lenses only.



Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following address:

TYPE OF RESIN

Mitsubishi Chemical Corporation 1-5 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking PH-350 was tested on LS-2 with clear lenses only

Note: Acryking PH-710 and Acryking PH-720 were tested on LS-1 and LS-2 with clear lenses only

Note: Acryking PH-511, Acryking PH-700, Acryking PH-800 and Acryking PH-800N5A were tested on LS-1-111

and LS-2-111

Note: LS-1-111J was tested with Acryking PH-710, Acryking PH-720, and Acryking PH-800 only.

Note: Acryking PH-930 was tested on Clear LS-1 111 and LS-2 111 only



Information on LHP100/LHC100, LHP100/AS4000, SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000, PHC200, PHC587, PHC587B, PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50,

UVHC3000KZ60 UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

> Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany

Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on LS1 and LS2 clear only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan Phone: +81-72-857-5530

Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on Lexan LS1-111 and LS2-111.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on SABIC LS-1 111 Clear in thicknesses 1.6 and 6.4 mm only



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coating may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested on clear LS-1, and LS-2



Information of X-48-5500-A18 hard coat may be obtained by writing to the following address:

Shin-Etsu Chemical Co., Ltd. 4-1, Marunouchi 1-Chome Chiyoda-ku, Tokyo 100-0005, Japan www.shinetsu.co.jp

Note: X-48-5500-A18 was tested on SABIC LS1 clear only.

Information on SH-2, SH-41, SH-50 and SH-51 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: Stanley SH-51 tested on Sabic LS-2 clear only.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
www.sabic.com Sabic Japan	LEXAN® LS-1 LEXAN® LS-1A LEXAN® LS-2 LEXAN® LS-2A LEXAN® LS-3 LEXAN® LSHF (HIGH FLOW) (coated or uncoated)	Polycarbonate	111 71194 71274 6162 6164 61228 414 4158 2148	White #! Smoke Grey #! Smoke Grey #! Red #! Red #! Red #! Yellow #! Yellow #!

Note:LEXAN® Protected Applications were tested behind Coated LS-2-111 Clear

Coated Sabic Japan plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings: See Mitsubishi Chemical Corporation

FUJIHARD 2500: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei Co., Ltd.

FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, FUJISOFT 2604 coatings: See Fujikura Kasei Co., Ltd.

KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100: See KCC Corporation

LHP100/LHC100, LHP100/AS4000: See Momentive Performance Materials Inc.

MODIHARD 200S: See NOF Coatings

MFR.

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHOLUCID No. 130C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

PHC200, PHC587, PHC587B, PHC587C, PHC587C2: See Momentive Performance Materials Inc.

RayGloss 402: See BASF Coatings GmbH

SH-2, SH-41, SH-50 and SH-51: See Stanley Electric Co., Ltd.

SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000: See Momentive Performance Materials Inc.

UVHC3000C, UVHC3000CS, UVHC3000K, UVHC3000K1, UVHC3000K1, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

 $UVT820V1, \, UVT820V2, \, UVT820V3, \, UVT820V4, \, UVT820V5, \, UVT820V6, \, UVT820V7 \, \, and \, \, UVT820V8: \, See \, Red \, Spot$

X-48-5500-A18: See Shin-Etsu Chemical Co., Ltd.

Coating Manufacturer in Alphabetical Order



Information on RayGloss 402 coatings may be obtained by writing:

BASF Coatings GmbH ECO/DT - C422 D-48165 Muenster Germany www.basf-coatings.com

Note: BASF RayGloss 402 was tested on LEXAN® LS-1 and LEXAN® LS-2 clear only.

TYPE OF RESIN

NUMBER

COLOR



Information on PHOLUCID No. 130C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan Telephone: 81-3-3506-3971

Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No. 130C and PHOLUCID No.180C were tested on Sabic LS-1 111 and Sabic LS-1 111J clear

only.



Information on FUJIHARD 2500, FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2567U-3, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-2, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2,

FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, and FUJISOFT 2604 coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJISOFT 2601 may NOT be used on lenses incorporating a reflex reflector or in front of a reflex reflector.

Note: FUJIHARD HH2566U-series and FUJIHARD HH2567U-series for use on clear lenses only

Note: FUJIHARD HH2540U-series, FUJIHARD HH2570U-series, FUJIHARD HH2561U-series and FUJIHARD

HH9986U-series is for use on clear

LS-2 plastics only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on LS-1 111 and LS-2

111 only.



Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000 and KUV-9100 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Note: KUV-3000, KUV-4000, KUV-5000, KUV-6000, and KUV-9100 were tested on Sabic LS1-111 and LS2-111

clear only.

Note: KUV-1000, and KUV-2000 is suitable for over 6.4 mm LS2-111 clear lenses only.

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

NUMBER

COLOR



MFR.

Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-6 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking PH-350 was tested on LS-2 with clear lenses only

Note: Acryking PH-710 and Acryking PH-720 were tested on LS-1 and LS-2 with clear lenses only

Note: Acryking PH-511, Acryking PH-700, Acryking PH-800 and Acryking PH-800N5A were tested on LS-1-111

and LS-2-111

Note: LS-1-111J was tested with Acryking PH-710, Acryking PH-720, and Acryking PH-800 only.

Note: Acryking PH-930 was tested on Clear LS-1 111 and LS-2 111 only



Information on LHP100/LHC100, LHP100/AS4000, SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000, PHC 200, PHC587, PHC587B, PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50,

UVHC3000KZ60, UVHC5000K, and UVHC5000K1, UVHC5000K2hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Materials Inc. Building V7 51368 Leverkusen Germany Momentive Performance 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on LS1 and LS2 clear only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan Phone: +81-72-857-5530

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on Lexan LS1-111 and LS2-111.

NUMBER

COLOR



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on SABIC LS-1 111 Clear in thicknesses 1.6 and 6.4 mm only



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coating may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested on clear LS-1, and LS-2



Information of X-48-5500-A18 hard coat may be obtained by writing to the following address:

Shin-Etsu Chemical Co., Ltd. 4-1, Marunouchi 1-Chome Chiyoda-ku, Tokyo 100-0005, Japan www.shinetsu.co.jp

Note: X-48-5500-A18 was tested on SABIC LS1 clear only.

Information on SH-2, SH-41, SH-50 and SH-51 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: Stanley SH-51 tested on Sabic LS-2 clear only.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
حبابک خمالاند	LEXAN® LS-1 P LEXAN® LS-2 LEXAN® LSHF (HIGH FL0 (coated or uncoated)	olycarbonate DW)	111 111H 111S 111SL	White #! White #! White #! White #!
Sabic Korea			111J 111X	White #! White #!
			GY3A578T	Smoke Grey#!
www.sabic.com			71127 71274	Smoke Grey#! Smoke Grey#!
			71194	Smoke Grey#!
			6162	Red #!
			6164	Red #!
			4158	Yellow #!
			414	Yellow #!

Note:LEXAN® Protected Applications were tested behind Coated LS-2-111 Clear

Coated Sabic Korea plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings: See Mitsubishi Chemical Corporation

FUJIHARD 2500: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei Co., Ltd.

TYPE OF RESIN

FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, FUJISOFT 2604 coatings: See Fujikura Kasei Co., Ltd.

KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100: See KCC Corporation

LHP100/LHC100, LHP100/AS4000: See Momentive Performance Materials Inc.

MODIHARD 200S: See NOF Coatings.

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHOLUCID No. 130C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

PHC200, PHC587, PHC587B, PHC587C, PHC587C2: See Momentive Performance Materials Inc.

RayGloss 402: See BASF Coatings GmbH

SH-2, SH-41, SH-50 and SH-51: See Stanley Electric Co., Ltd.

SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000: See Momentive Performance Materials Inc.

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red

X-48-5500-A18: See Shin-Etsu Chemical Co., Ltd.

Coating Manufacturer in Alphabetical Order



Information on RayGloss 402 coatings may be obtained by writing:

BASF Coatings GmbH ECO/DT - C422 D-48165 Muenster Germany www.basf-coatings.com

Note: BASF RayGloss 402 was tested on LEXAN® LS-1 and LEXAN® LS-2 clear only.



Information on PHOLUCID No. 130C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971 Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No. 130C and PHOLUCID No.180C were tested on Sabic LS-1 111 and Sabic LS-1 111J clear

only.



Information on FUJIHARD 2500, FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2566U-7, FUJIHARD HH2566U-8, FUJIHARD HH2566U-9, FUJIHARD HH2566U-3, FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD

HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, and FUJISOFT 2604 coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJISOFT 2601 may NOT be used on lenses incorporating a reflex reflector or in front of a reflex reflector.

Note: FUJIHARD HH2566U-series and FUJIHARD HH2567U-series for use on clear lenses only

Note: FUJIHARD HH2540U-series, FUJIHARD HH2570U-series, FUJIHARD HH2561U-series and FUJIHARD

HH9986U-series is for use on clear LS-2 plastics only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on LS-1 111 and LS-2

111 only.



Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000 and KUV-9100 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu Yongin-Si, Gyunggi-Do, South Korea www.kccworld.co.kr

Note: KUV-3000, KUV-4000, KUV-5000, KUV-6000, and KUV-9100 were tested on Sabic LS1-111 and LS2-111

clear only.

Note: KUV-1000, and KUV-2000 is suitable for over 6.4 mm LS2-111 clear lenses only. (Coating information continued on the next page)

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

<u>NUMBER</u>

COLOR



Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-7 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking PH-350 was tested on LS-2 with clear lenses only

Note: Acryking PH-710 and Acryking PH-720 were tested on LS-1 and LS-2 with clear lenses only

Note: Acryking PH-511, Acryking PH-700, Acryking PH-800 and Acryking PH-800N5A were tested on LS-1-111

and LS-2-111

Note: LS-1-111J was tested with Acryking PH-710, Acryking PH-720, and Acryking PH-800 only.

Note: Acryking PH-930 was tested on Clear LS-1 111 and LS-2 111 only



Information on LHP100/LHC100, LHP100/AS4000, SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000, PHC200, PHC587, PHC587B, PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60,

UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on LS1 and LS2 clear only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan Phone: +81-72-857-5530

Fax: +81-72-857-5640 Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on Lexan LS1-111 and LS2-111.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on SABIC LS-1 111 Clear in thicknesses 1.6 and 6.4 mm only



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coating may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested on clear LS-1, and LS-2

Information on SH-2, SH-41, SH-50 and SH-51 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro, Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: Stanley SH-51 tested on Sabic LS-2 clear only.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
حالن <i>ے</i>	LEXAN® LS-1 LEXAN® LS-1A LEXAN® LS-2	Polycarbonate	111 111C 111H	White #! White #! White #!
Sabic Plastics, Nansha China www.sabic.com	LEXAN® LS-3 LEXAN® LSHF (HIGH FLOW) (coated or uncoated)		111HX 111M 111S 112 51073 71127 71194 71274 GY3A578T 6111 6162 6164 61014 61079 61228 RD4B057T 414 4135 4158 4168 4169 4173 41105 41152 YW 5005T 21242	White Q White #! White #! White #! Smoke Grey #! Red #! Red #! Red #! Red #! Red #! Red #! Yellow #!
	LEXAN® XLS 1110 Protected LEXAN® XLS 1210 Protected		2148 11204 NA9G165T NA9H009T	Clear Blue #! Natural "!" Clear blue "!" Clear blue "!"

Note: LEXAN® Protected Applications were tested behind Coated LS-2-111 Clear

Coated Sabic Nansha, China plastics may only be treated with the following coatings applied to the molded lens:

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings: See Mitsubishi Chemical Corporation

FUJIHARD 2500: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

TYPE OF RESIN

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei Co., Ltd.

FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, FUJISOFT 2604 coatings: See Fujikura Kasei Co., Ltd.

KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000, KUV-9100: See KCC Corporation

LHP100/LHC100, LHP100/AS4000: See Momentive Performance Materials Inc.

MODIHARD 200S: See NOF Corporation.

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHOLUCID No. 130C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

PHC200, PHC587, PHC587B, PHC587C, PHC587C2: See Momentive Performance Materials Inc.

RayGloss 402: See BASF Coatings GmbH

SH-2, SH-41, SH-50 and SH-51: See Stanley Electric Co., Ltd.

SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000: See Momentive Performance Materials Inc.

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

TYPE OF RESIN

NUMBER

COLOR

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

X-48-5500-A18: See Shin-Etsu Chemical Co., Ltd.

Coating Manufacturer in Alphabetical Order



Information on RayGloss 402 coatings may be obtained by writing:

BASF Coatings GmbH ECO/DT - C422 D-48165 Muenster Germany www.basf-coatings.com

Note: BASF RayGloss 402 was tested on LEXAN® LS-1 and LEXAN® LS-2 clear only.



Information on PHOLUCID No. 130C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971 Facsimile: 81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No. 130C and PHOLUCID No.180C were tested on Sabic LS-1 111 and Sabic LS-1 111J and Sabic LS-1 111J clear only.

TYPE OF RESIN

NUMBER

COLOR



Information on FUJIHARD 2500, FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2. FUJIHARD HH2551U. FUJIHARD HH2551U-1. FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3, FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD

HH2570U-2, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and FUJISOFT 2600, FUJISOFT 2601, FUJISOFT 2602, FUJISOFT 2603, and FUJISOFT 2604 coatings may be obtained by writing to the following address:

> Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJISOFT 2601 may NOT be used on lenses incorporating a reflex reflector or in front of a reflex reflector.

Note: FUJIHARD HH2566U-series and FUJIHARD HH2567U-series for use on clear lenses only

Note: FUJIHARD HH2540U-series, FUJIHARD HH2570U-series, FUJIHARD HH2561U-series and FUJIHARD

HH9986U-series is for use on clear LS-2 plastics only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on LS-1 111 and LS-2

111 only.



Information on KUV-1000, KUV-2000, KUV-3000, KUV-4000, KUV-5000, KUV-6000 and KUV-9100 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Note: KUV-3000, KUV-4000, KUV-5000, KUV-6000, and KUV-9100 were tested on Sabic LS1-111 and LS2-111

clear only.

Note: KUV-1000, and KUV-2000 is suitable for over 6.4 mm LS2-111 clear lenses only.



Acryking F-328, Acryking K-101, Acryking PH-328, Acryking PH-350, Acryking PH-503, Acryking PH-511 or Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-8 Marunouchi, 1-Chome Chiyoda-Ku, Tokyo 100-8251 Japan

www.m-chemical.co.jp

Note: Acryking PH-350 was tested on LS-2 with clear lenses only

Note: Acryking PH-710 and Acryking PH-720 was tested on LS-1 and LS-2 with clear lenses only

Note: Acryking PH-511, Acryking PH-700, Acryking PH-800 and Acryking PH-800N5A was tested on LS-1-111 and

LS-2-111

Note: LS-1-111J was tested with Acryking PH-710, Acryking PH-720, and Acryking PH-800 only.

Note: Acryking PH-930 was tested on Clear LS-1 111 and LS-2 111 only



Information on LHP100/LHC100, LHP100/AS4000, SHP300/SHC3000, SHP300/AS4000, SHP401/AS4000, SHP401/SHC4002, SHP470 with AS4700 topcoat, SHC6000, PHC200, PHC587, PHC587B, PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50,

UVHC3000KZ60, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC5000 tested on LS1 and LS2 clear only



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on Lexan LS1-111 and LS2-111.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on SABIC LS-1 111 Clear in thicknesses 1.6 and 6.4 mm only



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coating may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested on clear LS-1, and LS-2



Information of X-48-5500-A18 hard coat may be obtained by writing to the following address: following address:

> Shin-Etsu Chemical Co., Ltd. 4-1, Marunouchi 1-Chome Chiyoda-ku, Tokyo 100-0005, Japan www.shinetsu.co.jp

Note: X-48-5500-A18 was tested on SABIC LS1 clear only.

Information on SH-2, SH-41, SH-50 and SH-51 hard coats may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153, Japan www.stanley.co.jp

Note: Stanley SH-51 tested on Sabic LS-2 clear only.

NUMBER

COLOR



MFR.

SABIC® PC ALS01 SABIC® PC ALS02 (coated only) Polycarbonate

GC9AT

White Q

Saudi Kayan Petrochemical Co.

www.sabic.com

Coated Saudi Kayan Petrochemical Co. plastics were only tested with the following coatings applied to the molded lens

Coating in Alphabetical Order and Corresponding Manufacturer

UVHC3000C, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials Inc.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

Coating Manufacturer in Alphabetical Order



Information on UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC3000, UVHC3000K, UVHC5000 and UVHC5000K tested on clear SABIC® PC ALS01 and SABIC® PC ALS02



Information on UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coating may be obtained by writing to the following address:

PAINT & VARNISH COMPANY, INC.

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested on clear SABIC® PC ALS01 and SABIC® PC ALS02

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

<u>NUMBER</u>

COLOR

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR	
حبابک <u>خ</u> طاعند	SABIC® PMMA 20HR SABIC® PMMA 23SP	Polymethyl Methacrylate (PMMA)	00900	Clear	

Saudi Methacrylates Company (SAMAC)

www.sabic.com



Q-Lab Test Services

- ▶ Florida & Arizona Outdoor Exposures
- Accelerated Laboratory Testing
- ▶ Evaluations



Weathering & Outdoor Climatic Testing

If you're concerned about your product's appearance or functional performance in the outdoor environment, you're not alone. Sunlight, heat, and moisture cause billions of dollars in product damage every year. A proper weathering testing program can help you anticipate and prevent a variety of potential product failures, meet durability specifications, and preserve your reputation for quality.

Will your product last outdoors? Don't guess when you can test!



WHY TEST?

Reliable weathering and corrosion data can help you:

- > Avoid unexpected product failures
- > Make the best material selection decisions
- > Validate new or less-expensive materials or additives
- > Improve your competitive advantage
- > Warranty your product's lifetime with confidence

Natural outdoor weathering and corrosion testing give the most realistic prediction of product performance. Accelerated testing, available both outdoors and in the laboratory, gives faster results but with some uncertainty about its accuracy. Many companies combine both approaches to ensure reliable results in the shortest time possible.

WHY CHOOSE Q-LAB?

Experienced and Reliable

Q-Lab provides the highest-quality weathering testing services. Our first natural weathering site opened in 1959. Today, our scientists and engineers participate and offer leadership in ISO, ASTM, IEC, GB, and numerous other professional organizations in creating standardized test methods and procedures.

Instant Credibility

When Q-Lab does your testing, the results have instant credibility with your customers and colleagues. Q-Lab conducts all exposure tests and evaluations in accordance with appropriate test methods from ASTM, ISO, BSI, DIN, JIS, SAE, GB, and other recognized organizations and is accredited by AMECA and AAMA.

Cost-Effective

Q-Lab's state-of-the-art test services are available at a surprisingly affordable price. In many cases, it is less costly to test with Q-Lab than to set up and run tests yourself.

Best Test Sites, Best Technology

South Florida and Arizona, where Q-Lab does most of its outdoor testing, have been recognized for over a century as harsh climates for product testing. If your products perform well in these benchmark locations, they will perform well just about anywhere. Q-Lab uses the most trusted accelerated weathering and corrosion technologies, used by thousands of companies in dozens of industries.



Natural Outdoor Testing

Location is everything. About one hundred years ago, companies in the paint and automotive industries realized that environmental conditions in South Florida and the Arizona desert were the harshest on their products. Several companies operated their own test sites in these locations, and they used what they learned to make their products durable enough to ensure generations of satisfied customers. Today, much of this testing has been consolidated at Q-Lab's sites in Florida and Arizona. Companies around the globe trust Q-Lab to perform their outdoor product testing.

FLORIDA

The subtropical climate of the Miami area has the perfect year-round combination of abundant sunlight, warm temperatures, and plentiful water. Sunshine during the summer months in Miami is quite similar to that of northern temperate regions. However, in the winter the difference is dramatic. The key point is that it is the same sun—just more of it, and for a longer duration each year. The same holds true for temperature, rainfall, dew, and humidity.

The result of this perfect combination of environmental factors is that exposures at Q-Lab Florida are accelerated compared to temperate climates. One year of Florida sunshine can produce the same weathering effects on materials as several years of weathering in most major markets around the world. Specimens that can withstand the sunlight, heat, and water in south Florida can be expected to be durable in most locations around the world.

SOUTH FLORIDA IS PERFECT FOR TESTING:

- > Sunlight (UV) stability
- > Moisture sensitivity
- > Mildew/mold resistance
- > Surface erosion
- > High-temperature resistance
- > Thermal shock response
- > Corrosion behavior
- > Moisture ingress
- > Acid rain resistance





ARIZONA

Arizona's desert climate is characterized by intense sunlight, very high temperatures, minimal rainfall, and very low humidity. Arizona desert exposures provide a different – in some ways harsher – exposure environment than Florida subtropical tests. Compared with Florida, Arizona is much hotter and receives about 15-20% more annual total solar and UV energy. Arizona experiences large day to night temperature variations, about 17 °C (31 °F) on average. Arizona receives little annual rainfall and has low atmospheric moisture overall. Specimens tested in the Arizona desert can be expected to have superior resistance to sunshine and elevated temperatures.

ARIZONA DESERT IS PERFECT FOR TESTING:

- Sunlight (UV) stability
- Heat aging effects
- > Thermal expansion stress resistance
- > Heat deflection and distortion
- > Material durability in low humidity environments

OHIO

Northeast Ohio has a Northern Temperate climate, meaning it experiences four true seasons during the year. Outdoor specimens are subject to a range of exposures to UV light, temperature, and water, including regular freeze/thaw cycles during the winter.

Although Northeast Ohio testing will generally not attain the acceleration of natural outdoor testing in Florida or Arizona, it does deliver conditions experienced by much of the population of the United States and the rest of the world.

Some industries include a benchmark Northern Temperate climate in their certification programs, in addition to Florida and Arizona, to ensure a fully comprehensive program for natural weathering. Ohio is ideal for meeting these requirements.







Accelerated Laboratory Testing

Q-Lab offers a full range of accelerated laboratory weathering and corrosion testing services at our fully-equipped facilities in Florida and Germany. Q-Lab can perform most testing that utilizes xenon arc, fluorescent UV, salt spray, or cyclic corrosion chambers. Contract testing at Q-Lab is an ideal solution for companies that:

- Have a short-term need for testing but aren't ready to invest in facilities and equipment
- Need additional testing capacity that the in-house lab can't accommodate
- Have a special project with a new test cycle that can't be performed in-house
- Need third-party verification of test results

STANDARD & CUSTOM EXPOSURES

Tests and evaluations are performed to appropriate ASTM, ISO, EN, DIN, JIS, SAE, GB, AATCC, or other standard procedures.

Visit **Q-Lab.com/standards** or contact Q-Lab to discuss a particular standard.

We can also perform custom exposures to meet your individual testing needs. More on page 13.

TWO LABS, ONE STANDARD OF QUALITY

- Homestead, Florida USA
- Saarbrücken, Germany

Both locations follow the ISO 17025 accredited Quality System, ensuring the best care for your projects.



Homestead, Florida USA



Saarbrücken, Germany



TYPES OF ACCELERATED TESTS



XENON ARC WEATHERING

For weathering tests that require full sunlight simulation, the **Q-SUN** xenon arc weathering chamber can perform a variety of methods from the automotive, textile, building material, paint, plastics, personal care, or other industries. Xenon arc instruments are usually the best choice for applications where color change is the primary failure mode of concern.



FLUORESCENT UV WEATHERING

When changes to physical properties of polymeric materials are the concern, the **QUV** accelerated weathering tester is an effective tool for comparative testing. Fluorescent UV lamps match the most damaging portion of the sunlight spectrum (UVA and UVB), reproduce degradation from germidical treatments (UVC), or simulate indoor environments (Cool White).



SALT SPRAY/ **CYCLIC CORROSION**

Q-FOG cyclic corrosion chambers can perform any test from simple salt spray to tests with precise control of RH and moisture transitions, which is required by most OEM automotive standards. In addition, certain models can also perform demanding modern test protocols like CASS and JASO M609.



Q-TRAC Natural Sunlight Concentrator Testing

Faster test, natural environment. Accelerated outdoor materials testing using a Q-TRAC natural sunlight concentrator delivers the benefits of testing in a natural outdoor environment while at the same time amplifying the sunlight and heat delivered to specimens. This testing is especially useful for highly-durable materials with long expected lifetimes.

SUPER-FAST RESULTS FROM NATURAL SUNLIGHT

The Q-TRAC delivers the same amount of damaging ultraviolet energy in just one year as specimens would experience in five years of Florida sunlight. Like other accelerated tests, sunlight concentrator testing allows products to be brought to market faster, but the Q-TRAC uses natural sunlight to reduce further the risk of generating erroneous test results. In this way, the Q-TRAC delivers dual benefits – the realism of natural exposures and the speed of accelerated laboratory tests.

Q-TRAC IS PERFECT FOR TESTING:

- > Roofing
- > Coil coatings
- > Fluoropolymers
- > Geosynthetics
- > Powder coatings
- > Building materials
- > Industrial coatings
- > Hardboard coatings



ENHANCED SUNLIGHT WITH CONCENTRATING MIRRORS

The Q-TRAC system uses an array of 10 flat mirrors to reflect and concentrate natural sunlight onto the test specimens. It further maximizes the exposure by automatically tracking the sun throughout the day in both azimuth (horizontal) and elevation (vertical).

Sunlight to Mirrors Cooling Duct Test Samples **Sunlight to Mirrors** Mirror Bed

Q-TRAC WATER SPRAY & SPECIAL APPLICATIONS

Water spray during the night time can simulate the time of wetness experienced in Florida, and during the day it can simulate thermal shock associated with rain bursts. During night-time wetting, specimens are oriented facing upward to give increased wetness and realism compared to original natural sunlight concentrator testing. Q-Lab also offers temperature-controlled Q-TRAC testing for more heat-sensitive specimens.

Several standardized cycles—including desert, freeze/thaw, and spray are available to test different materials and end-use application. Standards include:

- ASTM G90
- **ASTM D4141**
- **ASTM D4364**
- **ASTM D5105**
- **ASTM D5722**
- **SAE J1961**
- **SAE J576**
- ISO 877-3
- AAMA 623, 624 and 625







Automotive Interior Testing

Accelerated testing to simulate behind-glass environments. Interior components in automobiles and other behind-glass environments can experience higher temperatures than materials in service outdoors. AIM box testing delivers high temperatures in combination with natural sunlight behind window glass for fast, realistic testing.

AIM BOX

An Automotive Interior Materials (AIM) box is an under-glass enclosure that simulates the sunlight and heat found inside an automobile. Although this technology was developed for the automotive industry, it can be very effective for many applications where glass-filtered sunlight and heat are important stressors, such as building window assemblies and electrical enclosures.

Key test standards for AIM box testing include GMW 14873, GMW 16717, GMW 3417, GM 2617M, GM 3619M, GM 7454M, GM 7455M, GM 9538P, Ford DVM 0020, and ASTM G201.

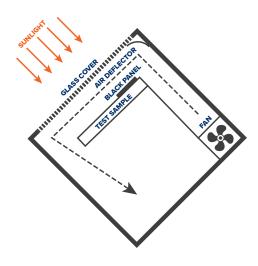
DEGRADATION MODES PRODUCED IN AIM BOX TESTING:

- Color change
- Cracking
- Peeling
- Oxidation
- Heat deflection
- **Tackiness**

REALISTIC SIMULATION

Testing automotive interiors can be different from testing other materials because air temperatures inside a vehicle can far exceed the temperature outside it. Materials can reach 100 °C or more in warmer climates. Furthermore, the light that reaches internal components is filtered by automotive glass, making it different from natural outdoor sunlight.

The AIM box uses tempered glass - clear or laminated - to simulate the sunlight spectrum experienced inside a car. In addition, a black panel thermometer continuously monitors the environment inside the box. A cooling fan and curtain are used to ensure that specimens are maintained at precise and realistic temperatures.





ACCELERATION

The AIM box in Arizona can perform precision azimuth tracking of the sun throughout the day. This boosts the total amount of solar radiation reaching the specimens for faster results without sacrificing accuracy.

TRUE AIM BOX

To increase the total amount of solar radiation exposure, Q-Lab's proprietary new TRUE (Tracking Reflecting Ultra Exposure) AIM box uses highly reflective mirrors and dual-axis tracking (azimuth and elevation) to focus more sunlight into the box interior. This technique approximately doubles the total sunlight received every day.





Standard Outdoor Exposures

True benchmarking via standardized testing. Natural outdoor testing according to international test standards gives improved consistency of results from test to test. Having a library of outdoor test data according to recognized test standards gives the best estimate for a product's service life and serves as an excellent basis for comparison to accelerated laboratory testing.

DIRECT EXPOSURE (ASTM G7, ASTM D1435)

Specimens can be securely mounted at a variety of angles for direct exposure to the sun. Various backing techniques are available to simulate the thermal environment of the specimen's intended service application. Plywood backing raises temperatures, while open- or mesh-backed specimens receive maximum natural air flow for cooler temperatures.



UNDER GLASS (ASTM G24, ISO 877-2)

These exposures are used to test interior-use materials, such as textiles and printing inks. Specimens are behind 3 mm window glass which will filter out short-wavelength (UVB) light. Exposures are typically at a 45° or 5° angle from horizontal.



BLACK BOX (ASTM D4141, GMW 14873)

These tests reproduce conditions found on the horizontal surfaces of a vehicle, including higher temperatures and longer wet times. Under glass black box exposures are used to test automotive interior materials or other applications that experience similar conditions.

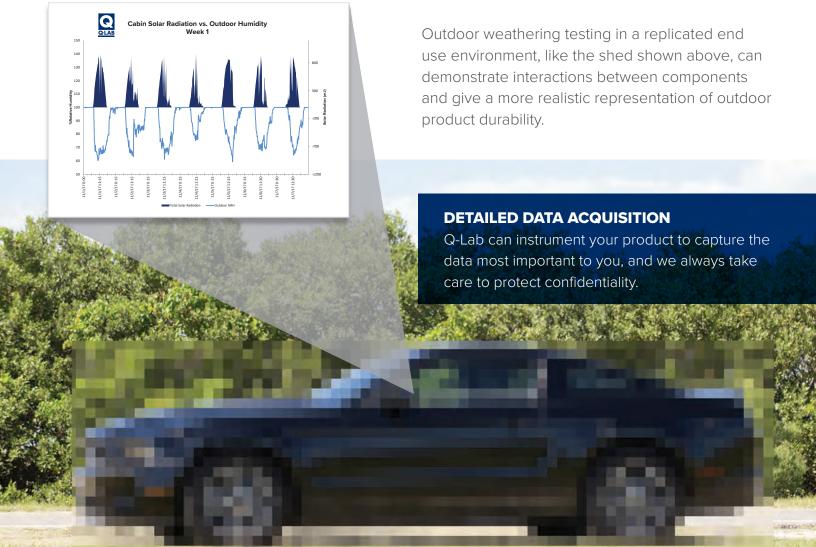


Other standard outdoor exposure test methods are available, including salt-accelerated, outdoor acid etch, and mildew-enhanced weathering.

Custom Tests & Special Projects

If you need a specialized test for a component, assembly, or complete product, Q-Lab can customize a test program to identify any problem areas quickly. Do you need to measure the temperature profile of multiple areas of your product throughout the day? Or design a test that accurately simulates your product's end use? Whatever your need, our experts can design a customized test solution to fit your budget.







Evaluations & Physical Testing

Exposing your products or materials is only half of the equation. Measuring how they degrade over time is the other half. Q-Lab's engineers and technicians are worldwide experts at identifying and quantifying how your materials change when exposed to weathering or corrosion tests. We have many tools at our disposal to tell you nearly everything you need to know about your product's performance.

VISUAL EVALUATIONS

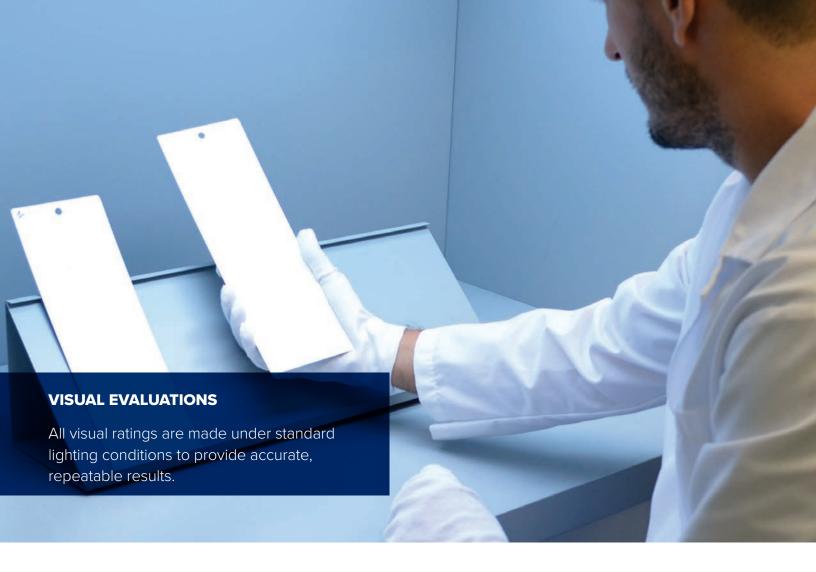
Visual evaluations detail all defects observed, such as cracking/checking, blistering, chalking, dirt retention, flaking, mildew growth, surface rust, or color change, according to standardized rating scales.

Q-Lab technicians are highly trained and experienced experts in the field of evaluation techniques and reporting scales. Many are actively involved in the organizations that create and maintain the standards relied upon by labs around the world.

COLOR & GLOSS MEASUREMENTS

Instrumental measurements of appearance and surface characteristics include gloss, distinctness of image, and color. These are used in place of or in addition to visual ratings, and are required by many standards. The science of color and appearance measurement can be very complex, and Q-Lab's experts can guide you through your options to ensure you get the correct data for your needs.





MECHANICAL TESTS

Mechanical tests on physical properties are necessary for many products and materials. They include:

- Drop impact
- Pencil hardness
- Tape adhesion
- Mandrel bend & elongation

- Tensile strength & elongation
- > Shear & peel adhesion
- Gravelometer stone chip impact
- Taber abrasion

PHOTOGRAPHY & SPECIAL HANDLING

A complete test program often includes other special services or handling. Common services include washing, polishing, scribing, and specimen weighing. Q-Lab can also photograph weathering and corrosion changes, which requires special lighting skills and equipment.





OUR GLOBAL NETWORK

We are committed to provide world-class technical, sales, and repair support in each of the over 60 countries in which we operate. Visit **Q-Lab.com/support** for contact information specific to your location and inquiry type.

GLOBAL HEADQUARTERS

WESTLAKE, OH USA info@q-lab.com +1-440-835-8700

Q-LAB CHINA

SHANGHAI, CHINA info.cn@q-lab.com +86-21-5879-7970

Q-LAB EUROPE, LTD.

BOLTON, ENGLAND info.eu@q-lab.com +44-1204-861616

Q-LAB FLORIDA

HOMESTEAD, FL USA testing@q-lab.com +1-305-245-5600

Q-LAB DEUTSCHLAND GMBH

SAARBRÜCKEN, GERMANY info.de@q-lab.com +49-681-857470

Q-LAB ARIZONA

BUCKEYE, AZ USA testing@q-lab.com +1-623-386-5140

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Samyang Corporation www.samyang.com	TRIREX 3022L1 TRIREX 3022L2 TRIREX 3022L3 (coated or uncoated)	Polycarbonate	100 R112 R212 R312 A115 A212 A307 A412	Clear \$# Red \$ Red \$ Red \$ Yellow \$ Yellow \$ Yellow \$

Coated Sam Yang Corporation plastics are only acceptable with the coatings listed below when properly applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101, or Acryking PH-503 hard coats: See Mitsubishi Chemical Corporation

KUV-3000, KUV-4000, KUV-5000, KUV-9000: See KCC Corporation.

LHP100/LHC100, LHP100/AS4000: See Momentive Performance Materials Inc. SHP401/AS4000,

SHP401/SHC4002 hard coats: See Momentive Performance Materials Inc. UVHC3000, UVHC3000K, UVHC5000

and UVHC5000K: See Momentive Performance Materials Inc.

Note: UVHC3000 and UVHC3000K series coatings were tested on TRIREX 3022L1 all had less than 7% haze and are designated by the # mark

UVT200, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7 and UVT610V8 coating: See Red Spot

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8.: See Red Spot.

Note: UVT610V and UVT820V series coatings all had less than 7% haze and are designated by the # mark.

Coating Manufacturer in Alphabetical Order

Information on KUV-3000, KUV-4000, KUV-5000, KUV-9100 coatings may be obtained by writing:



KCC Corporation 83 Mabook-Dong, Giheung-Gu Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Note: KUV-3000, KUV-4000, KUV-5000 and KUV-9100 were tested on clear Trirex3022L1 only

(Coating information continued on the next page)



Information on LHP100/LHC100, LHP100/AS4000, SHP401/AS4000, SHP401/SHC4002, UVHC3000, UVHC3000K, UVHC5000 and UVHC5000K hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Materials Inc. Building V7 51368 Leverkusen Germany Momentive Performance 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC3000, UVHC3000K, UVHC5000 and UVHC5000K tested on Trirex 3022L1 only.



Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking K-101 and Acryking PH-503 coatings may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi 1-Chome Chiyoda-Ku Tokyo 100-8251 Japan www.m-chemical.co.jp



Information on UVT200 and UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8. coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: UVT610V and UVT820V series coatings all had less than 7% haze and are designated by the # mark.

Note: UVT610V and UVT820V series coatings were tested on Trirex 3022L1 clear only.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Sumitomo	SUMIPEX® HT	Polymethyl	R004	Clear
Chemical	SUMIPEX® MG	Methacrylate	R006	Clear
Co., Ltd.	SUMIPEX® MH		011	Clear
www.sumitomo.c	SUMIPEX® MHF chem.co.jp SUMIPEX® MHG		012 014	Clear Clear
www.sumitomo-c	SUMIPEX® MH-EXTR	Δ	020	Clear
	SUMIPEX® MM		0151	Clear
	SUMIPEX® ME		0152	Clear
	SUMIPEX® TR		0153	Clear
	SUMIPEX® MH5		0154	Clear
	SUMIPEX® EPE		0155	Clear
	SUMIPEX® EPM		0161	Clear
	SUMIPEX® K203		0162	Clear
	SUMIPEX® K610		0163	Clear
	SUMIPEX® EP SUMIPEX® HTaaabS		0164	Clear
	SUMIPEX® HTaaabS SUMIPEX®Meguri® M	ш	0165 0195	Clear Clear
	30MIFEX@Megan® N	11 1	0999	Clear
			418(RR)	Red
			4052	Red
Note: SUMIPEX®	® K202 is now known as SUMIPE	X® EPM	4092	Red
Note: SUMIPEX®	BMHR is now known as SUMIPE	K® MH-EXTRA	4152	Red
Note: SUMIPEX®	® MT is now known as SUMIPEX	® ME	4162	Red
Note: SUMIPEX®	® K206 is now known as SUMIPE	X® EP	4172	Red
	PEX® HTaaabS, the following num	nbers are inserted	4182	Red
	-999/b:0-9 or hidden, S=Q~W		4184	Red
	® HTaaabS is only listed for lense	s with thickness	4312	Red
	m to 3.2 mm		4312-1 4314	Red Red
	® HTaaabS is only listed in clear 8 in thickness over 3.2mm is not f	or use in front a reflex	4314	Red
eflector or as a r		or use in none a reliex	4332	Red
	is only listed in thickness 6.4 mn	and above	4334	Red
	is only listed in thickness 6.4 mn		4401	Red
	,		4402	Red
			4403	Red
			4404	Red
			4406	Red
			4901	Red
			4902	Red
			4903 4904	Red Red
			4904	Red
			4911	Red
			4912	Red
			4913	Red
			4915	Red
			4998	Red
			4999	Red
			3101	Yellow
			3111	Yellow
			3121	Yellow
			3131 3231	Yellow Yellow

	ADE NAME AND OW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Sumitomo	SUMIPEX® HT	Polymethyl	3311	Yellow
Chemical	SUMIPEX® MG	Methacrylate	3321	Yellow
Co., Ltd.	SUMIPEX® MH		3331	Yellow
	SUMIPEX® MHF		3421	Yellow
www.sumitomo-chem.co			3901	Yellow
	SUMIPEX® MH-EXTI	RA	3902	Yellow
	SUMIPEX® MM		3904	Yellow
	SUMIPEX® ME		3906	Yellow
	SUMIPEX® TR		3910	Yellow
	SUMIPEX® MH5		3911	Yellow
	SUMIPEX® EPE		3914	Yellow
	SUMIPEX® EPM SUMIPEX® K203		3916 3017	Yellow Yellow
	SUMIPEX® K203 SUMIPEX® K610		3917 3918	Yellow
	SUMIPEX® EP		3925	Yellow
	SUMIPEX® HTaaabS		9001	Gray
	SUMIPEX® Meguri®		9001	Gray
	COMIT EX WICGONS	1711	9003	Gray
			9004	Gray
			9005	Gray
			9007	Gray
			9175	Gray
Note: SUMIPEX® K202 is	s now known as SUMIPE	(® EPM	9176	Gray
Note: SUMIPEX® MHR is	s now known as SUMIPEX	(® MH-EXTRA	9177	Gray
Note: SUMIPEX® MT is r	now known as SUMIPEX®	ME	9178	Gray
Note: SUMIPEX® K206 is	s now known as SUMIPE	⟨® EP	9179	Gray
Note: For SUMIPEX® HT	aaabS, the following num	bers are inserted	9180	Gray
	-9 or hidden, S=Q~W		9181	Gray
	bS is only listed for lenses	with thickness of	9182	Gray
1.6 mm-3.2 mm			9183	Gray
Note: SUMIPEX® HTaaa			9184	Gray
	ness over 3.2mm is not for	use in front a reflex	9185	Gray
reflector or as a r			9186	Gray
	available in thickness 6.4 r		9187	Gray
Note. Color 4406 is only i	isted in thickness 6.4 mm	and above	9188 9189	Gray
			9191	Gray Gray
			9260	Brown
			9261	Brown
			9262	Brown
			9263	Brown
			9265	Brown

	ar
Sumitomo Chemical SUMIPEX® HT Polymethyl R004 Cle Asia PTE Ltd. SUMIPEX® MG Methacrylate R006 Cle SUMIPEX® MH 011 Cle SUMIPEX® MHF 012 Cle SUMIPEX® MHG 014 Cle http://sumitomo-chem.com.sg SUMIPEX® MH-EXTRA 020 Cle SUMIPEX® MM 0151 Cle	ear ear ear ear ear
SUMIPEX® ME SUMIPEX® ME SUMIPEX® TR SUMIPEX® MH5 SUMIPEX® EPE SUMIPEX® EPE SUMIPEX® EPM SUMIPEX® EPM SUMIPEX® K203 SUMIPEX® K203	ear ear ear ear ear
SUMIPEX® K610 0163 Cle SUMIPEX® FP 0164 Cle SUMIPEX® HTaaabS 0165 Cle SUMIPEX® Meguri® MH 0195 Cle 0999 Cle	ear ear ear ear ear
Note: SUMIPEX® K202 is now known as SUMIPEX® EPM Note: SUMIPEX® MHR is now known as SUMIPEX® MH-EXTRA Note: SUMIPEX® MT is now known as SUMIPEX® ME Note: SUMIPEX® K206 is now known as SUMIPEX® EP Note: For SUMIPEX® HTaaabS, the following numbers are inserted 4052 Re A092 Re A192 Re A162 Re Note: SUMIPEX® K206 is now known as SUMIPEX® EP Note: For SUMIPEX® HTaaabS, the following numbers are inserted 4182	d d d d d
aaa: 001-999/b:0-9 or hidden, S=Q~W Note: SUMIPEX® HTaaabS is only listed for lenses with thickness of 1.6 mm-3.2 mm Note: SUMIPEX® HTaaabS is only listed in clear Note: SUMIPEX® HTaaabS is only listed in clear Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflector or as a reflex reflector 4312 Reflector or as a reflex reflector 4322 Reflector or as a reflex reflector	d d d d
Note: Color 0999 is only listed in thickness 6.4 mm and above Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Re 4402 Re 4403 Re 4404 Re 4406 Re	d d d d
4901 Re 4902 Re 4903 Re 4904 Re 4906 Re 4911 Re	d d d d
	d d d
3121 Yei 3131 Yei 3231 Yei 3232 Yei	llow llow llow llow llow llow
3331 Yel 3421 Yel 3901 Yel 3902 Yel 3904 Yel	llow llow llow llow llow llow

	E NAME AND FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Sumitomo	SUMIPEX® HT	Polymethyl	3910	Yellow
Chemical	SUMIPEX® MG	Methacrylate	3911	Yellow
Asia	SUMIPEX® MH	,	3914	Yellow
PTE., Ltd.	SUMIPEX® MHF		3916	Yellow
	SUMIPEX® MHG		3917	Yellow
http://sumitomo-chem.com.s		XTRΔ	3918	Yellow
mtp://sdrintomo-chem.com.s	SUMIPEX® MM	XIIVA	3925	Yellow
	SUMIPEX® ME		9001	Gray
	SUMIPEX® TR		9002	Gray
	SUMIPEX® MH5		9003	Gray
	SUMIPEX® EPE		9004	Gray
	SUMIPEX® EPM		9005	Gray
	SUMIPEX® K203		9007	Gray
	SUMIPEX® K610		9175	Gray
	SUMIPEX® EP		9176	Gray
	SUMIPEX® HTaaa		9177	Gray
	SUMIPEX® Megur	i® MH	9178	Gray
			9179	Gray
			9180	Gray
Note: SUMIPEX® K202 is no	ow known oo SLIMIDEN	(@ EDM	9181 9182	Gray Gray
Note: SUMIPEX® MHR is no	_		9183	Gray
Note: SUMIPEX® MT is now			9184	Gray
Note: SUMIPEX® K206 is no			9185	Gray
Note: For SUMIPEX® HTaa	_	=	9186	Gray
aaa: 001-999/b:0-9			9187	Gray
Note: SUMIPEX® HTaaabS	•	with thickness of	9188	Gray
1.6 mm-3.2 mm	,		9189	Gray
Note: SUMIPEX® HTaaabS	is only listed in clear		9191	Gray
Note: Color 4998 in thicknes	s over 3.2mm is not for	use in front a reflex	9260	Brown
reflector or as a refle			9261	Brown
Note: Color 0999 is only ava			9262	Brown
Note: Color 4406 is only liste	d in thickness 6.4 mm	and above	9263	Brown
			9265	Brown

Sumitomo Chemical SUMIPEX® MC SUMIPEX® MC SUMIPEX® MM SUMIPEX® MM O11 Clear Clear SUMIPEX® MM O11 Clear SUMIPEX® MM O11 Clear SUMIPEX® MM O11 Clear SUMIPEX® MM O11 Clear SUMIPEX® MM O15 Clear SUMIPEX® MS O153 Clear SUMIPEX® MS O153 Clear SUMIPEX® EPE O155 Clear SUMIPEX® EPE O155 Clear SUMIPEX® EPE O165 Clear SUMIPEX® EPE O165 Clear SUMIPEX® EPE O165 Clear SUMIPEX® EPE O165 Clear SUMIPEX® BM O161 Clear SUMIPEX® BM O162 Clear SUMIPEX® BM O162 Clear SUMIPEX® BM O165 Clear SUMIPEX® BM O165 Clear SUMIPEX® BM O165 Clear SUMIPEX® BM O165 Clear SUMIPEX® MG Clear SUMIPEX® BM O165 Clear SUMIPEX® MG Clear SUMIPEX® MG Clear Cl		ADE NAME AND OW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
SUMIPEX® MHF			, ,		
SUMIPEX® MHF SUMIPEX® MHG 014 Clear	Europe S.A./N.V.		Methacrylate		
SUMIPEX® MHG					
SUMIPEX® MH-EXTRA	www.sumitomo-cnem.be				
SUMIPEX® MM			۸		
SUMIPEX® ME					
SUMIPEX® TR					
SUMIPEX® LEPE 0155 Clear SUMIPEX® EPE 0165 Clear SUMIPEX® EPE 0166 Clear SUMIPEX® EPE 0161 Clear SUMIPEX® K810 0162 Clear SUMIPEX® K810 0163 Clear SUMIPEX® K810 0163 Clear SUMIPEX® HTaaabS 0165 Clear SUMIPEX® HTaaabS 0165 Clear SUMIPEX® HTaaabS 0165 Clear SUMIPEX® Meguri® MH 0195 Clear 418(RR) Red 4052 Red					
SUMIPEX® EPE 0155 Clear SUMIPEX® EPM 0161 Clear SUMIPEX® K203 0162 Clear SUMIPEX® K203 0162 Clear SUMIPEX® EP 0164 Clear SUMIPEX® EP 0164 Clear SUMIPEX® EP 0165 Clear SUMIPEX® HTaaabS 0165 Clear SUMIPEX® Meguri® MH 0195 Clear 0999 0999 Clear 09999 09999 09999 09999 09999 09999 09999 09999 09999 09999 09999 09999 099999 099999 099999 099999 099999 099999 0999999 099999999					
SUMIPEX® K203					Clear
SUMIPEX® K610		SUMIPEX® EPM		0161	Clear
SUMIPEX® HTaaabS 0165 Clear SUMIPEX® HTaaabS 0165 Clear SUMIPEX® Meguri® MH 0195 Clear 0999		SUMIPEX® K203			
SUMIPEX® HTaaabS 0185 Clear SUMIPEX® Meguri® MH 0195 Clear 0195 C					
SUMIPEX® Meguri® MH					
O999 Clear A18(RR) Red A18(RR) Red A052 R					
Note: SUMIPEX® K202 is now known as SUMIPEX® EPM 4052 Red		SUMIPEX® Meguri® N	ин		
Note: SUMIPEX® K202 is now known as SUMIPEX® EPM 4092 Red Note: SUMIPEX® MHR is now known as SUMIPEX® MH-EXTRA 4152 Red Note: SUMIPEX® MT is now known as SUMIPEX® ME 4162 Red Note: SUMIPEX® K206 is now known as SUMIPEX® EP 4172 Red Note: For SUMIPEX® L706 is now known as SUMIPEX® EP 4172 Red Note: For SUMIPEX® HTaaabS, the following numbers are inserted 4182 Red aaa: 001-999/b:0-9 or hidden, S=Q~W 4184 Red Note: SUMIPEX® HTaaabS is only listed for lenses with thickness of 4312 Red Note: SUMIPEX® HTaaabS is only listed in clear 4314 Red Note: SUMIPEX® HTaaabS is only listed in clear 4314 Red Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflector or as defeated in thickness 6.4 mm and above 4334 Red Note: Color 4998 is only listed in thickness 6.4 mm and above 4401 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4404 Red 4404 Red 4404 Red 4404 Red 4406 Red 4901 Red 4901 Red 4902 Red 4901 Red 4904 Red 4904 Red 4906 Red 4906 Red 4911 Red 4911 Red 4912 Red 4913 Red 4913 Red 4913 Red 4913 Red 4914 Red 4915 Red 4998 Red 4999 Red 4990 Red 4900 Red 4					
Note: SUMIPEX® K202 is now known as SUMIPEX® EPM 4092 Red Note: SUMIPEX® MHR is now known as SUMIPEX® ME 4152 Red Note: SUMIPEX® K206 is now known as SUMIPEX® EP 4162 Red Note: SUMIPEX® K206 is now known as SUMIPEX® EP 4172 Red Note: SUMIPEX® HTaaabS, the following numbers are inserted 4182 Red aaa: 001-999/b:0-9 or hidden, S=Q~W 4184 Red Note: SUMIPEX® HTaaabS is only listed for lenses with thickness of 4312-1 Red 1.6mm-3.2 mm 4312-1 Red Note: SUMIPEX® HTaaabS is only listed in clear 4314 Red Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflector or as a reflex reflector 4332 Red Note: Color 0999 is only available in thickness 6.4 mm and above 4401 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4901 Red 4901 Red 4901 Red 4901 Red 4902 Red 4901 Red 4904 Red 4904 Red 4					
Note: SUMIPEX® MTR is now known as SUMIPEX® ME 4152 Red Note: SUMIPEX® MT is now known as SUMIPEX® ME 4162 Red Note: SUMIPEX® MZ06 is now known as SUMIPEX® EP 4172 Red Note: For SUMIPEX® HTaaabS, the following numbers are inserted aaa: 001-999/b:0-9 or hidden, S=Q~W 4184 Red Note: SUMIPEX® HTaaabS is only listed for lenses with thickness of 1.6mm-3.2 mm 4312.1 Red Note: SUMIPEX® HTaaabS is only listed in clear 4314 Red Note: SUMIPEX® HTaaabS is only listed in clear 4314 Red Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflector or as a reflex reflector 4332 Red Note: Color 0999 is only available in thickness 6.4 mm and above 4334 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4404 Red 4404 Red 4901 Red 4901 Red 4901 Red 4901 Red 4901 Red 4901 Red 4902 Red 4904 Red 4904 Red 4904	Note: SLIMIDEY® K202 i	is now known as SLIMIDE	YO EDM		
Note: SUMIPEX® MT is now known as SUMIPEX® EP 4162 Red Note: SUMIPEX® K206 is now known as SUMIPEX® EP 4172 Red Note: For SUMIPEX® HTaaabS, the following numbers are inserted aaa: 001-999/b:0-9 or hidden, S=Q~W 4184 Red Note: SUMIPEX® HTaaabS is only listed for lenses with thickness of 1.6mm-3.2 mm 4312 Red 1.6mm-3.2 mm 4311 Red Note: SUMIPEX® HTaaabS is only listed in clear 4314 Red Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflector or as a reflex reflector 4332 Red Note: Color 0999 is only available in thickness 6.4 mm and above 4401 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4402 Red 4403 Red 4404 Red 4405 Red 4406 Red 4407 Red 4408 Red 4409 Red 4901 Red 4902 Red 4903 Red 4906 Red <td< td=""><td></td><td></td><td></td><td></td><td></td></td<>					
Note: SUMIPEX® K206 is now known as SUMIPEX® EP 4172 Red Note: For SUMIPEX® HTaaabS, the following numbers are inserted aaa: 001-999/b:0-9 or hidden, S=Q~W 4184 Red Note: SUMIPEX® HTaaabS is only listed for lenses with thickness of 1.6mm-3.2 mm 4312 Red Note: SUMIPEX® HTaaabS is only listed in clear 4314 Red Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflect or or as a reflex reflector 4332 Red Note: Color 0999 is only available in thickness 6.4 mm and above 4334 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4402 Red 4403 Red 4404 Red 4405 Red 4406 Red 4407 Red 4408 Red 4409 Red 4901 Red 4902 Red 4903 Red 4904 Red 4905 Red 4906 Red 4911 Red 4915 Red <td></td> <td></td> <td></td> <td></td> <td></td>					
Note: For SUMIPEX® HTaaabS, the following numbers are inserted aaa: 001-999/b:0-9 or hidden, S=Q~W 4184 Red Note: SUMIPEX® HTaaabS is only listed for lenses with thickness of 1.6mm-3.2 mm 4312-1 Red Note: SUMIPEX® HTaaabS is only listed in clear 4314 Red Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflector or as a reflex reflector 4332 Red Note: Color 0999 is only available in thickness 6.4 mm and above 4334 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4402 Red 4403 Red 4404 Red 4406 Red 4901 Red 4902 Red 4903 Red 4904 Red 4904 Red 4905 Red 4906 Red 4901 Red 4902 Red 4903 Red 4911 Red 4912 Red 4913 Red 4998 Red					
aaa: 001-999/b:0-9 or hidden, S=Q-W 4184 Red Note: SUMIPEX® HTaaabS is only listed for lenses with thickness of 1.6mm-3.2 mm 4312-1 Red Note: SUMIPEX® HTaaabS is only listed in clear 4314-1 Red Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflector or as a reflex reflector 4332-1 Red Note: Color 0999 is only available in thickness 6.4 mm and above 4334-1 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401-1 Red 4403-1 Red 4402-1 Red 4404-1 Red 4404-1 Red 4405-1 Red 4401-1 Red 4406-1 Red 4401-1 Red 4401-1 Red 4401-1 Red 4401-1 Red 4402-1 Red 4401-1 Red 4401-1 Red 4901-1 Red 4901-1 Red 4904-1 Red 4906-1 Red 4911-1 Red 4915-1 Red 4915-1 Red 4915-1 Red 4915-1 Red 4998-1					
1.6mm-3.2 mm				4184	Red
Note: SUMIPEX® HTaaabS is only listed in clear 4314 Red Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflector or as a reflex reflector 4332 Red Note: Color 0999 is only available in thickness 6.4 mm and above 4334 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4403 Red 4404 Red 4406 Red 4901 Red 4902 Red 4903 Red 4904 Red 4906 Red 4911 Red 4912 Red 4911 Red 4912 Red 4913 Red 4998 Red 4999 Red 4999 Red 4999 Red 3101 Yellow 3131 Yellow 3131 Yellow 3131 Yellow		abS is only listed for lense	s with thickness of		Red
Note: Color 4998 in thickness over 3.2mm is not for use in front a reflex reflector or as a reflex reflector 4322 Red Note: Color 0999 is only available in thickness 6.4 mm and above 4434 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4402 Red 4403 Red 4404 Red 4406 Red 4901 Red 4902 Red 4903 Red 4904 Red 4906 Red 4911 Red 4912 Red 4913 Red 4915 Red 4998 Red 4999 Red 3101 Yellow 3121 Yellow 3131 Yellow 3121 Yellow					
reflector or as a reflex reflector Note: Color 0999 is only available in thickness 6.4 mm and above Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4402 Red 4403 Red 4404 Red 4406 Red 4901 Red 4902 Red 4902 Red 4903 Red 4904 Red 4904 Red 4906 Red 4911 Red 4911 Red 4912 Red 4912 Red 4912 Red 4915 Red 4915 Red 4915 Red 4915 Red 4916 Red 4917 Red 4918 Red 4918 Red 4919 Red 4910 Red 4911 Yellow 3111 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3131 Yellow					
Note: Color 0999 is only available in thickness 6.4 mm and above 4334 Red Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4402 Red 4403 Red 4404 Red 4406 Red 4901 Red 4902 Red 4904 Red 4906 Red 4911 Red 4912 Red 4913 Red 4915 Red 4998 Red 4999 Red 3101 Yellow 3121 Yellow 3131 Yellow 3131 Yellow			or use in front a reflex		
Note: Color 4406 is only listed in thickness 6.4 mm and above 4401 Red 4402 Red 4403 Red 4404 Red 4406 Red 4901 Red 4902 Red 4903 Red 4904 Red 4904 Red 4911 Red 4911 Red 4912 Red 4911 Red 4915 Red 4915 Red 4915 Red 4915 Red 4915 Red 4916 Red 4917 Red 4918 Red 4918 Red 4919 Red 4910 Red 4911 Red 4911 Red 4911 Red 4912 Red 4911 Red 4912 Red 4913 Red 4914 Red 4915 Red 4915 Red 4915 Red 4916 Red 4917 Red 4918 Red 4918 Red 4919 Red 4910 Red 491					
4402 Red 4403 Red 4404 Red 4404 Red 4406 Red 4401 Red 4901 Red 4902 Red 4903 Red 4904 Red 4906 Red 4911 Red 4912 Red 4912 Red 4913 Red 4915 Red 4915 Red 4998 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3131 Yellow					
4403 Red 4404 Red 4406 Red 4406 Red 4901 Red 4902 Red 4903 Red 4904 Red 4906 Red 4911 Red 4911 Red 4912 Red 4912 Red 4915 Red 4915 Red 4998 Red 4998 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3131 Yellow	Note: Color 4406 is only	listed in thickness 6.4 min	n and above		
4404 Red 4406 Red 4901 Red 4902 Red 4903 Red 4904 Red 4906 Red 4911 Red 4912 Red 4912 Red 4913 Red 4915 Red 4915 Red 4998 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3131 Yellow					
4406 Red 4901 Red 4902 Red 4903 Red 4904 Red 4906 Red 4911 Red 4912 Red 4912 Red 4913 Red 4915 Red 4998 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
4901 Red 4902 Red 4903 Red 4904 Red 4906 Red 4911 Red 4912 Red 4912 Red 4913 Red 4915 Red 4915 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
4902 Red 4903 Red 4904 Red 4906 Red 4911 Red 4912 Red 4913 Red 4915 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
4904 Red 4906 Red 4911 Red 4912 Red 4913 Red 4915 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
4906 Red 4911 Red 4912 Red 4913 Red 4915 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow				4903	Red
4911 Red 4912 Red 4913 Red 4915 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
4912 Red 4913 Red 4915 Red 4918 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
4913 Red 4915 Red 4918 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
4915 Red 4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
4998 Red 4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
4999 Red 3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
3101 Yellow 3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
3111 Yellow 3121 Yellow 3131 Yellow 3231 Yellow					
3121 Yellow 3131 Yellow 3231 Yellow					
3131 Yellow 3231 Yellow					
3231 Yellow					
0000					
3232 Yellow				3232	Yellow

	E NAME AND V FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Cumitama	CUMIDEVA LIT	Dolymathyl	3241	Vallou
Sumitomo Chemical	SUMIPEX® HT SUMIPEX® MG	Polymethyl Methacrylate	3311	Yellow Yellow
Europe	SUMIPEX® MH	wethaci ylate	3321	Yellow
S.A./N.V.	SUMIPEX® MHF		3331	Yellow
5.A./N. V.	SUMIPEX® MHG		3421	Yellow
www.sumitomo-chem.be	SUMIPEX® MH-EXTR	?A	3901	Yellow
www.sumitomis shom.so	SUMIPEX® MM		3902	Yellow
	SUMIPEX® ME		3904	Yellow
	SUMIPEX® TR		3910	Yellow
	SUMIPEX® MH5		3911	Yellow
	SUMIPEX® EPE		3914	Yellow
	SUMIPEX® EPM		3916	Yellow
	SUMIPEX® K203		3917	Yellow
	SUMIPEX® K610		3918	Yellow
	SUMIPEX® EP		3925	Yellow
	SUMIPEX® HTaaabS		9001	Gray
	SUMIPEX® Meguri® N	ΜΗ	9002	Gray
			9003	Gray
			9004	Gray
			9005	Gray
			9007	Gray
N. C. CLIMIDENC MOSS:	. OUNDEY	0 FDM	9175	Gray
Note: SUMIPEX® K202 is n	_		9176	Gray
Note: SUMIPEX® MHR is n			9177	Gray
Note: SUMIPEX® MT is now Note: SUMIPEX® K206 is n			9178 9179	Gray
Note: For SUMIPEX® HTaa			9179	Gray
aaa: 001-999/b:0-9 or h		ers are miseried	9181	Gray Gray
Note: SUMIPEX® HTaaabS		with thickness	9182	Gray
of 1.6 mm-3.2 mm	is only listed for lenses	With thekness	9183	Gray
Note: SUMIPEX® HTaaabS	is only listed in clear		9184	Gray
Note: Color 4998 in thickness		use in front a reflex	9185	Gray
reflector or as a refle		acc in home a rollex	9186	Gray
Note: Color 0999 is only ava		nm and above	9187	Gray
Note: Color 4406 is only list			9188	Gray
,			9189	Gray
			9191	Gray
			9260	Brown
			9261	Brown
			9262	Brown
			9263	Brown
			9265	Brown

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Sumika Polycarbonate Ltd.	SD POLYCA™ 303-10 SD POLYCA™ 303-30	Polycarbonate	30003 30004	White \$ White \$
www.scpc.jp	(coated or uncoated)		160039 150038	Red \$ Yellow \$

Formerly Sumika Stylon Polycarbonate Limited

Coated Sumika Polycarbonate Limited plastics are only acceptable with the coatings listed below when properly applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7, FUJIHARD HH3035U-3, and FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei Co., Ltd.

Coating Manufacturer in Alphabetical Order



Information on FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3 coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo, 105-0011 Japan www.fkkasei.co.jp

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Sumika Polycarbonate Ltd.	SD POLYCA™ SD2133V SD POLYCA™ SD2143V (Coated only) -	Polycarbonate Polycarbonate	AA059 AA087	White \$ White \$

www.scpc.jp

Formerly Sumika Stylon Polycarbonate Limited

Coated Sumika Polycarbonate Ltd. plastics are only acceptable with the coatings listed below when properly applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking PH-328 hard coats: See Mitsubishi Chemical Corporation

Coating Manufacturer in Alphabetical Order



Information on Mitsubishi Chemical Corporation Acryking PH-328 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR	
Sumika	SD POLYCA™ TR0601A	Inner Lens		Clear !	
Polycarbonate Ltd. (coated or uncoated www.scpc.jp	SD POLYCA™ TR0601A4)	Polycarbonate			

Formerly Sumika Stylon Polycarbonate Limited

Sumika Polycarbonate Limited inner lens plastics are only listed when tested behind clear coated Covestro AL2447

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

NUMBER

COLOR



MFR.

Suzhou Double SX-304
Elephant Optical
Material Co., Ltd.
Chongqing Double
Elephant Optical Material Co., Ltd.

PMMA

Clear

Note: Suzhou Double Elephant Optical Material Co., Ltd. and Chongqing Double Elephant Optical Material Co., Ltd. Is listed from 1.6 to 2.3 mm only.

Manufacturer contact information:

Suzhou Double Elephant Optical Material Co., Ltd. Add: No. 18, Donghai Road Yangtze River International Chemical Industrial Park, Zhangjiagang, Jiangsu

P.R. China

TEL: +86-512-80152090

http://www.jiangsusx.com/en/szgxcl/

Chongqing Double Elephant Optical Material Co., Ltd. Add: Room 1-1, No.20 Qixin Avenue, Yanjia Street, Changshou District, Chongqing,

P.R. China

Tel: 18013601067

http://www.jiangsusx.com/en/cqgxcl/

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR	
Teijin Limited	Panlite L-1225V (coated)	Polycarbonate	100-M	Clear Q2	

www.teijin.co.jp

Coated Teijin Limited Panlite L-1225V plastic is only acceptable with the coatings listed below when properly applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

PH-328, PH-700, Acryking PH-720: See Mitsubishi Chemical Corporation

SH-50: See Stanley Electric Co., Ltd.

Coating Manufacturer in Alphabetical Order



MITSUBISHI Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking F-700 and CHEMICAL Acryking PH-720 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking F-328, Acryking F-700 and Acryking PH-720 were tested on clear L-1225Z only.

Information on Stanley Electric SH-50 coating may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153-8636 Japan www.stanley.co.jp

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR	
Teijin Limited	Panlite L-1225VE (coated)	Polycarbonate	100-M	Clear Q2	

www.teijin.co.jp

Coated Teijin Limited Panlite L-1225VE plastic is only acceptable with the coatings listed below when properly applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

SH-50: See Fujikura Kasei Electric

Coating Manufacturer in Alphabetical Order

Information on Stanley Electric SH-50 coating may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153-8636 Japan www.stanley.co.jp

Teijin	Panlite L-1225Z	Polycarbonate	100	Clear #
Limited	Panlite L-1225ZA		100-C	Clear #
	Panlite L-1225ZL	Nista Isalawa	100-L	Clear #
	Panlite L-1225Z U (see	e Note below)	100-K	Clear #
	Panlite L-1250Z		100-M	Clear #
	(coated or uncoated)		110	Clear #
www.teijin.co.jp			1000	Clear #
0-1	d for Tolling Lineite d/other	41	1100	Clear #
Color numbers listed for Teijin Limited(other than the numbers for above already having suffixes) can have suffixes represinted by the			1200	Clear#
		tixes represinted by the	1300	Clear#
following alphabets:	: -L, -LIVI, -IVI, -K		1400	Clear #
			200	Red#
			206	Red#
			210	Red #
			216	Red#
			220	Red#
			226	Red#
			230	Red#
			236	Red#
			240	Red#
			246	Red #
			250	Red#
			260	Red#
			270	Red#
			280	Red#
			290	Red#

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Teijin	Panlite L-1225Z	Polycarbonate	2000	Red#
Limited	Panlite L-1225ZA	1 olycarbonato	2100	Red #
Limitod	Panlite L-1225ZU (See Note)		2200	Red #
	Panlite L-1225ZL		2300	Red#
	Panlite L-1250Z		2400	Red #
	(coated or uncoated)		2500	Red#
www.teijin.co.jp	,		2600	Red#
			2700	Red#
Color numbers liste	d for Teijin Limited(other than the	e numbers for	2800	Red#
the above already h	2900	Red#		
following alphabets:	300	Yellow #		
•			310	Yellow #
			320	Yellow #
			330	Yellow #
			340	Yellow #
			350	Yellow #
			360	Yellow #
			370	Yellow #
			380	Yellow #
			390	Yellow #
			400	Yellow #
			410	Yellow #
			420	Yellow #
			430	Yellow #
			440	Yellow #
			3000	Yellow #
			3100	Yellow #
			3200	Yellow #
			3300	Yellow #
			3400	Yellow #
			3500	Yellow #
			3600	Yellow #
			3700 3800	Yellow #
			3900	Yellow # Yellow #
			7000	
			7100	Gray # Gray #
			7200	Gray # Gray #
			7300	Gray #
			7400	Gray #
			7500	Gray #
			7600	Gray #
			7700	Gray #
			7800	Gray #
			7900	Gray #
				<i>,</i>

Teijin Limited Panlite L-1225ZU must be coated to pass weathering.

Coated Teijin Limited Plastics are only acceptable with the coatings listed below when properly applied to the molded lens.

(Coating information continued on the next page)

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101S, Acryking PH-328, Acryking PH-511, Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930: See Mitsubishi Chemical Corporation

CD-2M12: See HIPRO Polymer Materials (Jiangsu) Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2605, FUJIHARD HH2610, FUJIHARD HH3176: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

Fujikura NH: See Fujikura Kasei, Co., Ltd.

KUV-5000, KUV-6000: See KCC Corporation.

MODIHARD 200S: See NOF Corporation

PHOLUCID No.150C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

SH-41, SH-50, SH-51 and SH-61: See Stanley Electric

SM710, SM115 hard coat: See Teijin Limited

UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, and UVHC3000KZ60: Momentive Performance Materials Inc.

UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials.

UVHC8100: Momentive Performance Materials Inc.

(Coating information continued on the next page)

UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8.: See Red Spot.

Coating Manufacturer in Alphabetical Order



Information on PHOLUCID No.150C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971

Facsimile: +81-3-5511-8542 www.cmp.co.jp

Note: PHOLUCID No.150C was tested on Panlite L-1225Z 100K clear only.

Note: PHOLUCID No.180C was tested on Panlite L-1225ZA and Panlite L-1225Z 100K clear only.



Information on FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2566U-9, FUJIHARD HH2566U-3, FUJIHARD HH2567U-1, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2567U-3, FUJIHARD HH2570U-1, FUJIHARD HH2570U-1, FUJIHARD

HH2570U-2, FUJIHARD HH2605, FUJIHARD HH2610, FUJIHARD HH3176, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and Fujikura NH coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD coatings were tested on Panlite L-1225Z only

Note: FUJIHARD HH3401U coatings was tested on Panlite L-1225Z 100 only

Note: Panlite L-1225ZU is only available on Fujikura NH coatings



Information on HIPRO Polymer Materials (Jiangsu) CD-3M12 may be obtained by writing to the following address:

HIPRO Polymer Materials (Jiangsu) Co., Ltd. North Industrial Park Wuxi, Jiangsu P.R. China

Tel.: +86-510-87855326

Website: www.hiprocoating.com

Note: HIPRO CD-3M12 is NOT suitable for use with or in front of a reflex reflector

Note: HIPRO CD-3M12 was only tested on Teijin L-1225Z 100K Clear.



Information on KUV-5000 and KUV-6000 coatings may be obtained by writing:

KCC Corporation 83 Mabook-Dong, Giheung-Gu, Yongin-Si, Gyunggi-Do South Korea www.kccworld.co.kr

Note: KUV-5000 and KUV-6000 were tested on Panlite L-1225Z only Note: Panlite L-1225ZU is not available with KCC Corporation coatings



Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking K-101S, Acryking PH-328, Acryking PH-511, Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-750 Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking F-328, Acryking K-101S, Acryking PH-328, Acryking PH-511, Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-750, Acryking PH-800 and Acryking PH-800N5A were tested on clear L-1225Z only.

Note: Panlite L-1225ZU is available with MRC-720 only above 3.2 mm

Note: Acryking PH-930 was tested on clear Panlite L-1225Z and Panlite L-1225ZA

COLOR



Information on UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2, and UVHC8100 hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Materials Inc. Building V7 51368 Leverkusen Germany Momentive Performance 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: Panlite L-1225ZU is not available with Momentive coatings Note: UVHC5000 series were tested on L-1225Z clear only.

Note: UVHC8100 was tested on Panlite L-1225Z-100, I-1225-100K, L-1225Z-100M



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on Panlite L-1225V 100K Clear in thicknesses 1/11 to 1/4 inch only.



Information on Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8. coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 were tested L-1225Z, L-1225ZL and L-1250Z clear only.

TYPE OF RESIN

NUMBER

COLOR

Information on Stanley Electric SH-41, SH-50, SH-51 and SH-61 may be obtained by writing to the following company:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: Stanley SH-51 only tested on clear Panlite plastics.

Note: Stanley SH-61 only tested on clear Panlite L-1225Z 100-M.

Note: Panlite L-1225ZU is not to be used in front of a reflex reflector in lens thicknesses of 3.2mm

Information on SM710 coating or SM115 hard coat may be obtained by writing to the following address:

Teijin Limited
Plastics Sales Division
Kasumigaseki Common Gate West Tower
2-1, Kasumigaseki 3-Chome, ChiyodaKu, Tokyo, 100-8585
Japan
www.teijin.co.jp

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Teijin Polycarbonate	Panlite L-1225V (coated)	Polycarbonate	100-M	Clear &

www.teijin.co.jp

China Ltd.

Coated Teijin Polycarbonate China Panlite L-1225V 100-M plastic is only acceptable with the coatings listed below when properly applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking PH-328, Acryking PH-700, Acryking PH-720: See Mitsubishi Chemical Corporation

SH-50: See Stanley Electric

Coating Manufacturer in Alphabetical Order



MITSUBISHI Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking PH-700 and CHEMICAL Acryking PH-720 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking F-328, Acryking PH-700 and Acryking PH-720 were tested on clear L-1225Z only.

Information on Stanley Electric SH-50 coating may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153-8636 Japan www.stanley.co.jp

Teijin	Panlite L-1225Z	Polycarbonate	100	Clear #
Polycarbonate	Panlite L-1225ZA	,	100-C	Clear #
China, Ltd.	Panlite L-1225ZL		100-L	Clear#
	Panlite L-1250Z		100-K	Clear#
www.teijin.co.jp	(coated or uncoated)		100-M	Clear#
	,		110	Clear#
Color numbers list	ted for Teijin Polycarbonat	e China, Ltd. (other than	1000	Clear#
the numbers for a	bove already having suffix	es) can have suffixes	1100	Clear#
	following alphabets: -L, –		1200	Clear#
			1300	Clear #
			1400	Clear #
			200	Red#
			206	Red#
			210	Red#
			216	Red#
			220	Red#

	TRADE NAME AND			
MFR.	FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Teijin	Panlite L-1225Z	Polycarbonate	226	Red#
Polycarbonate	Panlite L-1225ZA	•	230	Red#
China, Ltd.	Panlite L-1225ZL		236	Red#
	Panlite L-1250Z		240	Red#
	(coated or uncoated)		246	Red#
www.teijin.co.jp			250	Red#
			260	Red#
	d for Teijin Polycarbonate Chi		270	Red#
	ove already having suffixes) ca		280	Red#
represinted by the	following alphabets: -L, –LM, -	-IVI, -K	290 2000	Red# Red#
			2100	Red #
			2200	Red #
			2300	Red #
			2400	Red#
			2500	Red #
			2600	Red#
			2700	Red #
			2800	Red#
			2900	Red#
			300	Yellow #
			310	Yellow #
			320	Yellow #
			330	Yellow #
			340	Yellow #
			350	Yellow #
			360	Yellow #
			370	Yellow #
			380	Yellow #
			390 400	Yellow # Yellow #
			410	Yellow #
			420	Yellow #
			430	Yellow #
			440	Yellow #
			3000	Yellow #
			3100	Yellow #
			3200	Yellow #
			3300	Yellow #
			3400	Yellow #
			3500	Yellow #
			3600	Yellow #
			3700	Yellow #
			3800	Yellow #
			3900	Yellow #
			7000	Gray #
			7100	Gray #
			7200 7200	Gray #
			7300 7400	Gray #
			7400 7500	Gray #
			7600 7600	Gray # Gray #
			7700	Gray # Gray #
			7700 7800	Gray # Gray #
			7900	Gray #
	(0 - 4 i i - 5	E E	7 000	July #

TYPE OF RESIN

NUMBER

COLOR

Coated Teijin Polycarbonate China Ltd. plastics are only acceptable with the coatings listed below when properly applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101S, Acryking PH-328, Acryking PH-511, Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-750 Acryking PH-800, Acryking PH-800N5A and Acryking PH-930: See Mitsubishi Chemical Corporation

CD-2M12: See HIPRO Polymer Materials (Jiangsu) Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2605, FUJIHARD HH2610, FUJIHARD HH3176: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

MODIHARD 200S: See NOF Coatings

PHOLUCID No.150C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

SH-41, SH-50, SH-51 and SH-61: See Stanley Electric

SM710, SM115 hard coat: See Teijin Limited

UVHC3000C, UVHC3000CS, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC3000K1, UVHC3000K-Z: Momentive Performance Materials Inc.

UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials.

UVHC8100: Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

Coating Manufacturer in Alphabetical Order



Information on PHOLUCID No.150C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971 Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No.150C was tested on Panlite L-1225Z 100K clear only.

Note: PHOLUCID No.180C was tested on Panlite L-1225ZA and Panlite L-1225Z 100K clear only.



Information on FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3, FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2, FUJIHARD HH2605, FUJIHARD HH2610,

FUJIHARD HH3176, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N7 and Fujikura NH coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD coatings were tested on Panlite L-1225Z only

Note: FUJIHARD HH3401U coatings was tested on Panlite L-1225Z 100 only

Note: Panlite L-1225ZU is only available on Fujikura NH coatings

MFR.

TRADE NAME AND FLOW FORMULATION

TYPE OF RESIN

NUMBER

COLOR



Information on HIPRO Polymer Materials (Jiangsu) CD-3M12 may be obtained by writing to the following address:

HIPRO Polymer Materials (Jiangsu) Co., Ltd. North Industrial Park Wuxi, Jiangsu P.R. China

Tel.: +86-510-87855326

Website: www.hiprocoating.com

Note: HIPRO CD-3M12 is NOT suitable for use with or in front of a reflex reflector

Note: HIPRO CD-3M12 was only tested on Teijin L-1225Z 100K Clear.



Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking K-101S, Acryking PH-328, Acryking PH-511, Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking F-328, Acryking K-101S, Acryking PH-328, Acryking PH-511, Acryking PH-710, Acryking PH-720, Acryking PH-750 and Acryking PH-800 and Acryking PH-800N5A were tested on clear L-1225Z only.

Note: Acryking PH-930 was tested on clear Panlite L-1225Z and Panlite L-1225ZA



Information on Information on UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC3000K1, UVHC3000K-Z, UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2 and UVHC8100 hard coat may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: Panlite L-1225ZU is not available with Momentive coatings Note: UVHC5000 series were tested on L-1225Z clear only.

Note: UVHC8100 was tested on Panlite L-1225Z-100, I-1225-100K, L-1225Z-100M



MFR.

Information on MODIHARD 200S coatings may be obtained by writing to the following address:

TYPE OF RESIN

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on Panlite L-1225V 100K Clear in thicknesses 1/11 to 1/4 Inch.



Information on Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8 coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Information on Stanley Electric SH-41, SH-50, SH-51 and SH-61 coating may be obtained by writing to the following address:

> Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153-8636 Japan www.stanley.co.jp

Note: Stanley SH-51 only tested on clear Panlite plastics.

Note: Stanley SH-61 only tested on clear Panlite L-1225Z 100-M.

Information on SM710 coating or SM115 hard coat may be obtained by writing to the following address:

Teijin Limited Plastics Sales Division Kasumigaseki Common Gate West Tower 2-1, Kasumigaseki 3-Chome, Chiyoda-Ku, Tokyo, 100-8585 Japan www.teijin.co.jp

MFR.	FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR	
Teijin Polycarbonate Singapore PTE Ltd.	Panlite L-1225V (coated)	Polycarbonate	100-m	Clear #	

www.teijin.co.jp

Coated Teijin Polycarbonate Singapore PTE Panlite L-1225V 100-M plastic is only acceptable with the coatings listed below when properly applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking PH-328, Acryking PH-700 and Acryking PH-720: See Mitsubishi Chemical Corporation

SH-50: See Stanley Electric

Coating Manufacturer in Alphabetical Order



Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking PH-700 and Acryking PH-720 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking F-328, and Acryking PH-720 were tested on clear L-1225Z only.

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Information on Stanley Electric SH-50 coating may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153-8636 Japan www.stanley.co.jp

Teijin	Panlite L-1225Z	Polycarbonate	100	Clear#
Polycarbonate	Panlite L-1225ZA	•	100-C	Clear#
Singapore	Panlite L-1225ZL		100-L	Clear#
PTE Ltd.	Panlite L-1250Z		100-K	Clear#
	(coated or uncoated)		100-M	Clear#
. www.teijin.co.jp	,		110	Clear#
			1000	Clear#
Color numbers list	ed for Teijin Polycarbona	te Singapore PTE Ltd.	1100	Clear #
(other than the nur	nbers for above already h	naving suffixes)	1200	Clear #
can have suffixes i	represinted by the following	ng alphabets: -L, –LM, -M, -K	1300	Clear#
	•		1400	Clear#
			200	Red#
			206	Red#
			210	Red#

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Teijin Polycarbonate Singapore PTE Ltd. www.teijin.co.jp	Panlite L-1225Z Panlite L-1225ZA Panlite L-1225ZL Panlite L-1250Z (coated or uncoated)	Polycarbonate	216 220 226 230 236 240 246	Red # Red # Red# Red# Red # Red # Red #
(other than the num	d for Teijin Polycarbonate Sing bers for above already having sinted by the following alphabe	suffixes) can	246 250 260 270 280 290 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 300 310 320 330 340 350 360 370 380 390 400 410 420 430	Red # Yellow #
			440 3000 3100 3200 3300 3400 3500 3600 3700 3800 7000 7100 7200 7300 7400 7500 7600 7700 7800 7900	Yellow # Gray #

MFR.

Coated Teijin Polycarbonate Singapore PTE Ltd. are only acceptable when treated with the following coatings applied to the molded lens:

TYPE OF RESIN

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101S, Acryking PH-328, Acryking PH-511, Acryking PH-710, Acryking PH-700, Acryking PH-720, Acryking PH-750 Acryking PH-800, Acryking PH-800N5A and Acryking PH-930: See Mitsubishi Chemical Corporation

CD-2M12: See HIPRO Polymer Materials (Jiangsu) Co., Ltd.

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fuiikura Kasei. Co., Ltd.

FUJIHARD HH2605, FUJIHARD HH2610, FUJIHARD HH3176: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH3372U: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH3401U: See Fujikura Kasei, Co., Ltd.

FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

MODIHARD 200S: NOF Corporation

PHOLUCID No.150C and PHOLUCID No.180C: See Chugoku Marine Paints, Ltd.

SH-41, SH-50, SH-51 and SH-61: See Stanley Electric

SM710, SM115 hard coat: See Teijin Limited

UVHC3000. UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC3000K1, UVHC3000K-Z: See Momentive Performance Materials Inc.

UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials.

UVHC8100: See Momentive Performance Materials Inc.

UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8; See Red Spot.

Coating Manufacturer in Alphabetical Order

TYPE OF RESIN



MFR.

Information on PHOLUCID No.150C and PHOLUCID No.180C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6. Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971 Facsimile: +81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No.150C was tested on Panlite L-1225Z 100K clear only.

Note: PHOLUCID No.180C was tested on Panlite L-1225ZA and Panlite L-1225Z 100K clear only.



Information on FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2566U, FUJIHARD HH2566U-1, FUJIHARD HH2566U-2, FUJIHARD HH2566U-3, FUJIHARD HH2567U, FUJIHARD HH2567U-1, FUJIHARD HH2567U-2, FUJIHARD HH2567U-3, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2, FUJIHARD HH2605, FUJIHARD HH2610,

FUJIHARD HH3176, FUJIHARD HH3372U, FUJIHARD HH3401U, FUJIHARD HH3482U, FUJIHARD HH9986U-N3, FUJIHARD HH9986U-N5, FUJIHARD HH9986U-N7 and Fujikura NH coatings may be obtained by writing to the following address:

> Fuiikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD coatings were tested on Panlite L-1225Z only.



Information on HIPRO Polymer Materials (Jiangsu) CD-3M12 may be obtained by writing to the following address:

HIPRO Polymer Materials (Jiangsu) Co., Ltd. North Industrial Park Wuxi, Jiangsu P.R. China

Tel.: +86-510-87855326

Website: www.hiprocoating.com

Note: HIPRO CD-3M12 is NOT suitable for use with or in front of a reflex reflector

Note: HIPRO CD-3M12 was only tested on Teijin L-1225Z 100K Clear.

TRADE NAME AND MFR. FLOW FORMULATION

TYPE OF RESIN

<u>NUMBER</u>

COLOR



Information on Mitsubishi Chemical Corporation Acryking F-328, Acryking K-101S, Acryking PH-328, Acryking PH-511, Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-800 and Acryking PH-800N5A coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking F-328, Acryking K-101S, Acryking PH-328, Acryking PH-511, Acryking PH-700, Acryking PH-710, Acryking PH-720, Acryking PH-750 Acryking PH-800 and Acryking PH-800N5A were tested on clear L-1225Z

only.

Note: Acryking PH-930 was tested on clear Panlite L-1225Z and Panlite L-1225ZA



Information on UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC3000K1, UVHC3000K-Z, UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2, and UVT8100 hard coat may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: Panlite L-1225ZU is not available with Momentive coatings Note: UVHC5000 series were tested on L-1225Z clear only.

Note: UVHC8100 was tested on Panlite L-1225Z-100, I-1225-100K, L-1225Z-100M



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on Panlite L-1225V 100K Clear in thicknesses 1/11 to 1/4 Inch only.



Information on Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8 coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Information on Stanley Electric SH-41, SH-50 and SH-51 coating may be obtained by writing to the following address:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153-8636 Japan www.stanley.co.jp

Note: Stanley SH-51 only tested on clear Panlite plastics.

Note: Stanley SH-61 only tested on clear Panlite L-1225Z 100-M.

Information on SM710 coating or SM115 hard coat may be obtained by writing to the following address:

Teijin Limited
Plastics Sales Division
Kasumigaseki Common Gate West Tower
2-1, Kasumigaseki 3-Chome,
Chiyoda-Ku, Tokyo, 100-8585
Japan
www.teijin.co.jp

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Thai Polycarb Co., Ltd. www.tpcc-tpa	IUPILON ML-200 IUPILON ML-300	Polycarbonate	001 0001 R591A R530B R591C R591B R591S 101 102 103 104 R138J 1001 1002 301 300	Clear # Clear # Clear # Clear #! Clear # Clear # Clear # Clear # Red # Yellow # Yellow #
Note:	ML-300/R1GYH, ML-300/R1BN ML-300/R265E, ML-400R/R20 HL-3003/N418, HL-3003/N424 HL-3503/N414, HL-3503/N418 HL-3503/N428 are for protecte	6F, HL-3003/N414, , HL-3003/N428 B HL-3503/N424, and	ML-300/R1GYH ML-300/R1BWH ML-400/R148A ML-300/R265E ML-400R/R206F HL-3003/N414	Red! Red! Red! Yellow! Yellow! Clear!
Note:	All Mitsubishi Engineering prot were tested behind clear coate		HL-3003/N418 HL-3003/N424 HL-3003/N428 HL-3503/N414 HL-3503/N418 HL-3503/N424 HL-3503/N428	Clear! Clear! Clear! Clear! Clear! Clear! Clear!

Coated Thai Polycarbonate Co., Ltd. lupilon plastics may only be treated with the following coatings listed below.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-503, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-750, Acryking PH-800, Acryking PH-800N5A and Acryking PH-930: See Mitsubishi Chemical Corporation

FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2: See Fujikura Kasei

FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2561U-3: See Fujikura Kasei

FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9: See Fujikura Kasei

<u>NUMBER</u>

COLOR

FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2: See Fujikura Kasei

FUJIHARD HH3372U: See Fujikura Kasei

MFR.

FUJIHARD HH3401U: See Fujikura Kasei

FUJIHARD HH3482U: See Fujikura Kasei

IUPILON Coat UV: See Mitsubishi Engineering Plastics Corp.

MODIHARD 200S: See NOF Corporation

NIPPE UVI Coat UT-1678: See Nippon Paint Automotive Coatings Co., Ltd.

PHC587C, PHC587C2: See Momentive Performance Materials Inc.

PHOLUCID No.180C and 185C: See Chugoku Marine Paints Ltd..

SH-41, SH-50, and SH-51: See Stanley Electric

UVHC3000C, UVHC3000CS, UVHC3000K, UVHC3000K1, UVHC3000K1, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60: See Momentive Performance Materials Inc.

UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2: See Momentive Performance Materials

UVHC8100: See Momentive Performance Materials

UVT200V1, UVT200V2, UVT200V3 and UVT200V5, : See Red Spot.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, and UVT610V8: See Red Spot.

UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8: See Red Spot

Coating Manufacturer in Alphabetical Order



Information on PHOLUCID No.180C and 185C coatings may be obtained by writing:

Chugoku Marine Paints, Ltd. Tokyo Club Building, 2-6, Kasumigaseki 3-Chome Chiyoda-Ku, Tokyo, 100-0013 Japan

Telephone: 81-3-3506-3971 Facsimile: 81-3-5511-8542

www.cmp.co.jp

Note: PHOLUCID No.180C was tested on lupilon ML-300AH R591C and lupilon ML-300 R591B clear only.

Note: PHOLUCID No.185C was tested on Iupilon ML-300AH R591C Clear only (Coating information continued on the next page)

TYPE OF RESIN

<u>NUMBER</u>

COLOR



Information on FUJIHARD HH2540U, FUJIHARD HH2540U-1, FUJIHARD HH2540U-2, FUJIHARD HH2551U, FUJIHARD HH2551U-1, FUJIHARD HH2551U-2, FUJIHARD HH2551U-3, FUJIHARD HH2561U-6, FUJIHARD HH2561U-7, FUJIHARD HH2561U-8, FUJIHARD HH2561U-9, FUJIHARD HH2570U, FUJIHARD HH2570U-1, FUJIHARD HH2570U-2, FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH2540U series, HH2551U series, HH2561U series and HH2570U series were tested on ML-

300 clear only

Note: FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested on ML-300 and ML-350

Clear Only

Information on IUPILON COAT UV may be obtained by writing to the following address:

Mitsubishi Engineering Plastics Corp. Plastics Sales Department 5-2, Marunouchi 2-Chome Chiyoda–Ku, Tokyo Japan www.m-ep.co.jp



Information on Acryking F-328, Acryking K-101-S, Acryking PH-220, Acryking PH-328, Acryking PH-503, Acryking PH-700, Acryking PH-710 Acryking PH-720, Acryking PH-750 Acryking PH-800, Acryking PH-800N5A and Acryking PH-930 coatings may be obtained by writing to the following company:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp

Note: Acryking PH-503, PH-700, PH-710, Acryking PH-720, PH-750 Acryking PH-800 and Acryking PH-800N5A

were tested on ML- 300 clear only

Note: Acryking PH-930 was tested on clear IUPILON ML-300 and IUPILON ML-300AH only



Information on PHC587C, PHC587C2, UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K, UVHC3000K1, UVHC3000K-Z, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60, UVHC5000, UVHC5000K, and UVHC5000K1, UVHC5000K2hard coats may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany

Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

Note: UVHC3000K, UVHC3000K1-40, UVHC3000K1-50, and UVHC3000KZ60 only tested on lupilon ML-300 /

ML-350

Note: UVHC3000 only tested on Iupilon ML-350

Note: UVHC8100 was tested on clear lupilon ML-300 and lupion ML-350



Information on NIPPE UVI Coat UT-1678 coating may be obtained by writing to the following address:

Nippon Paint Automotive Coatings Co., Ltd. 2-14-1 Shodai-Ohtani Hirakata-City, Osaka 573-1153 Japan

Phone: +81-72-857-5530 Fax: +81-72-857-5640

Website: www.nipponpaint-automotive.com

Note: NIPPE UVI Coat UT-1678 was tested on lupilon ML-300 and ML-350 clear.



Information on MODIHARD 200S coatings may be obtained by writing to the following address:

NOF Corporation Yebis Garden Place Tower 20-3, Ebisu 4-Chome, Shibuya-Ku, Tokyo 150-6019 Japan www.nof.co.jp

Note: MODIHARD 200S is acceptable on ML-300 Clear in thicknesses 2.3-6.4 mm only



Information on UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 coatings may be obtained by writing to the following address:

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT200V1, UVT200V2, UVT200V3, UVT200V5, UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 UVT820V1, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 is only acceptable on clear ML-300 and ML-350.

Information on Stanley Electric SH-41, SH-50 and SH-51 may be obtained by writing to the following company:

Stanley Electric Co., Ltd. 2-9-13, Nakameguro Meguro-Ku, Tokyo 153 Japan www.stanley.co.jp

Note: SH-41 may be used be used in front of a reflex reflector. Material would have code Q

Note: Stanley SH-51 only tested on clear IUPILON ML-300



Connecting ideas with solutions

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Trinseo
Altuglas Division
Altuglas S.r.l. (Italy)
Trinseo Korea Ltd.
Altuglas Division
www.trinseo.com
www.plexiglas.com
www.altuglas.com

TRADE NAME AND			
FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
ALTUGLAS™/PLEXIGLAS™	Polymethyl	78048	Bronze
ALTUGLAS™ R-Life	Methacrylate	78072	Bronze
PLEXIGLAS™ R-Life		770	Blue
DR		779	Blue
DRF		48268	Blue
GR 8		LPL	Clear
GR 8C		11	Clear
GR 9D		100	Clear
GR 9DX		101	Clear
GR 9E		102	Clear
H		P2	Clear
HT(121) IMPLEX®		UVA5 7082	Clear
			Gray
MC MLOT		7090 7132	Gray
MI-2T MI-4T		7132 7137	Gray
MI-7		7157 7155	Gray Gray
MI-7T		7155 7157	•
V(022)		7161	Gray Gray
V(040)		7189	Gray
V(052)		7191	Gray
V(052)		7192	Gray
V(415)		7215	Gray
V(811)		7280	Gray
V(811)UVA		7082	Gray
V(825)		7090	Gray
V825T CR50		7132	Gray
V(825)T		7137	Gray
V(825)TP		7155	Gray
V(826)		7157	Gray
V(920)		7161	Gray
V(920)T		7189	Gray
V(922)		7191	Gray
(- /		7192	Gray
		7215	Gray
		7280	Gray
		7283	Gray
		56072	Gray
		56507	Gray
		56101	Gray
		58102	Gray
		58200	Gray
		58224	Gray

TYPE OF RESIN NUMBER

15000

15003

16020

16021

16030

16031

16048

Red

Red

Red

Red

Red

Red

Red

COLOR



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FLOW FORMULATION

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Trinseo	ALTUGLAS™/PLEXIGLAS™	Polymethyl	58225	Gray
Altuglas Division	ALTUGLAS™ R-Life	Methacrylate	58235	Gray
Altuglas S.r.l. (Italy)	PLEXIGLAS™ R-Life		58247	Gray
Trinseo Korea Ltd.	DR		58294	Gray
Altuglas Division	DRF		58308	Gray
www.trinseo.com	GR 8		13	Red
www.plexiglas.com	GR 8C		119	Red
www.altuglas.com	GR 9D		126	Red
	GR 9DX		145	Red
	GR 9E		180	Red
	Н		366	Red
	HT(121)		461	Red
	IMPLEX®		610	Red
	MC		616	Red
	MI-2T		659	Red
	MI-4T		756	Red
	MI-7		868	Red
	MI-7T		908	Red
	V(022)		957	Red
	V(040)		1003	Red
	V(052)		1025	Red
	V(052i)		1032	Red
	V(415)		1101	Red
	V(811)		1108	Red
	V(811)UVA		1110	Red
	V(825)		1115	Red
	V825T CR50		1116	Red
	V(825)T		1118	Red
	V(825)TP		1120	Red
	V(826)		1132	Red
	V(920)		1175	Red
	V(920)T		1180	Red
	V(922)		1185	Red
	,		1190	Red
			1191	Red
			1195	Red
			1794	Red



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	TRADE NAME AND			
<u>MFR.</u>	FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Trinseo	ALTUGLAS™/PLEXIGLAS™	Polymethyl	16500	Red
Altuglas Division	ALTUGLAS™ R-Life	Methacrylate	16501	Red
Altuglas S.r.l. (Italy)	PLEXIGLAS™ R-Life		18008	Red
Trinseo Korea Ltd.	DR		18016	Red
Altuglas Division	DRF		18035	Red
www.trinseo.com	GR 8		18036	Red
www.plexiglas.com	GR 8C		18037	Red
www.altuglas.com	GR 9D		18039	Red
	GR 9DX		18040	Red
	GR 9E		18042	Red
	Н		18043	Red
	HT(121)		18044	Red
	IMPLEX®		18046	Red
	MC		18047	Red
	MI-2T		18048	Red
	MI-4T		18134	Red
	MI-7		18152	Red
	MI-7T		18165	Red
	V(022)		18166	Red
	V(040)		18175	Red
	V(052)		18176	Red
	V(052í		18181	Red
	V(415)		18210	Red
	V(811)		18213	Red
	V(811)UVA		18227	Red
	V(825)		18228	Red
	V825T CR50		18229	Red
	V(825)T		18241	Red
	V(825)TP		18242	Red
	V(826)		18244	Red
	V(920)		18249	Red
	V(920)T		18250	Red
	V(922)		18254	Red
	(-)		18274	Red
			18287	Red
			18301	Red
			18309	Red
			119/10	Red
			119/3	Red
			119/8	Red
			18236	White
			18258	White
			. 5-55	

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TYPE OF RESIN NUMBER

28019 28020

28021

28029 28033

28039

28040 28041

Yellow

Yellow Yellow

Yellow

Yellow Yellow

Yellow

Yellow

COLOR



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FLOW FORMULATION

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Trinseo	ALTUGLAS™/PLEXIGLAS™	Polymethyl	18259	White
Altuglas Division	ALTUGLAS™ R-Life	Methacrylate	48361	White
Altuglas S.r.l. (Italy)	PLEXIGLAS™ R-Life		237	Yellow
Trinseo Korea Ltd	DR		245	Yellow
Altuglas Division	DRF		263	Yellow
www.trinseo.com	GR 8		268	Yellow
www.plexiglas.com	GR 8C		282	Yellow
www.altuglas.com	GR 9D		283	Yellow
_	GR 9DX		283/3	Yellow
	GR 9E		283/8	Yellow
	Н		283/B-3	Yellow
	HT(121)		283/B-8	Yellow
	IMPLEX®		883	Yellow
	MC		885	Yellow
	MI-2T		937	Yellow
	MI-4T		938	Yellow
	MI-7		951	Yellow
	MI-7T		2361	Yellow
	V(022)		2820	Yellow
	V(040)		2821	Yellow
	V(052)		2830	Yellow
	V(052i		2831	Yellow
	V(415)		2833	Yellow
	V(811)		2838	Yellow
	V(811)UVA		25000	Yellow
	V(825)		25001	Yellow
	V825T CR50		25004	Yellow
	V(825)T		26022	Yellow
	V(825)TP		26038	Yellow
	V(826)		26045	Yellow
	V(920)		26500	Yellow
	V(920)T		26501	Yellow
	V(922)		26505	Yellow
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Connecting ideas with solutions

	TRADE NAME AND			
MFR.	FLOW FORMULATION	TYPE OF RESIN	NUMBER.	COLOR
Trinseo.	ALTUGLAS™/PLEXIGLAS™	Polymethyl	28042	Yellow
Altuglas Division	ALTUGLAS™ R-Life	Methacrylate	28043	Yellow
Altuglas S.r.l. (Italy)	PLEXIGLAS™ R-Life	•	28044	Yellow
Trinseo Korea Ltd.	DR		28090	Yellow
Altuglas Division	DRF		28107	Yellow
www.trinseo.com	GR 8		28152	Yellow
www.plexiglas.com	GR 8C		28154	Yellow
www.altuglas.com	GR 9D		28161	Yellow
	GR 9DX		28162	Yellow
	GR 9E		28163	Yellow
	Н		28198	Yellow
	HT(121)		28209	Yellow
	IMPLEX®		28210	Yellow
	MC		28213	Yellow
	MI-2T		28223	Yellow
	MI-4T		28226	Yellow
	MI-7		28921	Yellow
	MI-7T		H 285	Yellow
	V(022)			
	V(040)			
	V(052)			
	V(052i			
	V(415)			
	V(811)			
	V(811)UVA			
	V(825)			
	V825T CR50			
	V(825)T			
	V(825)TP			
	V(826)			
	V(920)			
	V(920)T			
	V(922)			

Note: Red 16021 is listed in 4 mm and 5 mm thickness only.

	TRADE NAME AND			
MFR.	FLOW FORMULATION	TYPE OF RESIN	<u>NUMBER</u>	COLOR

Trinseo Netherlands b.v. CALIBRE C303HP-15 Polycarbonate CALIBRE C303HP-22

30003

Clear \$

(Formerly Styron Netherlands BV)

Coated Trinseo Netherlands b.v. plastics may only be treated with the following coatings applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

SHP401/AS4000: See Momentive Performance Materials Inc.

UVHC3000: See Momentive Performance Materials Inc.

Coating Manufacturer in Alphabetical Order



Information on SHP401/AS4000 and UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60 hard coat may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Unigel Plastics	Acrigel® ECP100 Acrigel® LEP100 Acrigel® LEP250 Acrigel® ECL400	Polymethyl Methacrylate	CR001 RB011 RB322 AB111	Clear Red Red Yellow
Formerly Polycar	bonatos Do Brasil and Resarbr	as Da Bahia		
Unigel Plastics	DUROLON V-1900 DUROLON V-2200	Polycarbonate	C901 C902 C903 R901 R902 R903 R904 R905 Y901 Y902 Y903 Y904 Y905	Clear (See note) Clear (See note) Clear (See note) Red (See note) Yellow (See note)

Coated Unigel Plastics plastics are only acceptable with the coatings listed below when properly applied to the molded lens.

Note: Uncoated V1900 is only acceptable for thickness of 6.4 mm

Note: V-1900 with UVHC300 is only acceptable for use in a lens with, or in front of, a reflex reflector for the 6.4mm thickness

Note: V-1900 with UVHC300 is acceptable for use in a lens without a reflex reflector for any thickness

Note: V-1900 with UVT200 is only acceptable for use in a lens with, or in front of, a reflex reflector for the 1.6mm thickness

Note: V-1900 with UVT200 is acceptable for use in a lens without a reflex reflector for any thickness

Uncoated V2200 is only acceptable for thicknesses of 3.2 to 6.4 mm

Note: V-2200 with UVHC 3000 is acceptable for any use on any lamp for all thicknesses

Note: V-2200 with UVT200 is only acceptable for use for a lens with, or in front of, a reflex reflector in the 3.2mm thickness.

Note: V-2200 with UVT200 is acceptable for use a lens without reflex reflectors for all thicknesses.

Coating in Alphabetical Order and Corresponding Manufacturer

Acryking K-101: See Mitsubishi Chemical Corporation

Tarfloncoat 101, and Tarfloncoat 201: See Idemitsu Kosan Co., Ltd.

UVHC3000: See Momentive Performance Materials, Inc.

UVT200V1, UVT200V2, UVT200V3 and UVT200V5: See Red Spot.

Coating Manufacturer in Alphabetical Order

Information on Tarfloncoat 101 and Tarfloncoat 201 coatings may be obtained by writing to the following address:

Idemitsu Kosan Co., Ltd. 1-1, Marunochi 3-Chome, Chiyoda-Ku, Tokyo 100 Japan www.idss.co.jp/



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Information on Mitsubishi Chemical Corporation Acryking K-101 coating may be obtained by writing to the following address:

Mitsubishi Chemical Corporation 1-1 Marunouchi, 1-Chome Chiyoda–Ku, Tokyo 100-8251 Japan www.m-chemical.co.jp



Information on UVHC3000, UVHC3000CC, UVHC3000LS, UVHC3000K1-40, UVHC3000K1-50, UVHC3000KZ60 hard coat may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com



Information on UVT200V1, UVT200V2, UVT200V3 and UVT200V5 coatings may be obtained by writing to the following address:

PAINT & VARNISH COMPANY, INC.

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: UVT200 not suitable for use in front of a reflex reflector.

MFR.	TRADE NAME AND FLOW FORMULATION	TYPE OF RESIN	NUMBER	COLOR
Unitika Ltd.	U-POLYMER P-1001	POLYARYLATE		Clear
	U-POLYMER P-1001A		1010	Clear
	U-POLYMER P-1001S		2403	Red
www.unitika.co.jp	U-POLYMER P-3001S		2410	Red
			5-2094	Red
			10-2051	Red
			3071	Yellow
			3301	Yellow
			3401	Yellow
			3410	Yellow
			4410	Yellow
			5-3091	Yellow
			05-3060	Yellow
			10-4032	Yellow
			050-3070	Yellow
			079-3070	Yellow
			P-1001A 5050	Selective Yellow

Note: Unitika U-Polymer polyarylate not to be used as a reflex reflector or in front of a reflex reflector.

TRADE NAME AND MFR. FLOW FORMULATION TYPE OF RESIN NUMBER COLOR

Wanhua Chemical Group Co., Ltd. No. 59 Chongqing Street YEDA, Yantai, Shandong,

ACDVDLAC@ LID04	Polymethyl		Clear
ACRYPLAS® HD01	Methacrylate	R01	Red
ACRYPLAS® HD03	Polymethyl Methacrylate		Clear

China

www.whchem.com Color R01 is listed from 2.3-6.4mm only.

Wanhua Chemical Group Co., Ltd.

HL6157	Polycarbonate	9103	Clear Q
HL6227			

No. 59 Chongqing Street YEDA, Yantai, Shandong China

www.whchem.com

Wanhua Chemical Group Co., Ltd. polycarbonate plastics are only acceptable with the coatings listed below when properly applied to the molded lens.

Coating in Alphabetical Order and Corresponding Manufacturer

FUJIHARD HH3540U, FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U: See Fujikura Kasei Co., Ltd.

UVHC3000, UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2: See Momentive Performance Materials, Inc.

UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 See Red Spot.

UVT820: See Red Spot.

Coating Manufacturer in Alphabetical Order



Information on FUJIHARD HH2540U, FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U coatings may be obtained by writing to the following address:

Fujikura Kasei Co., Ltd. 6-15 Shibakoen 2-Chome Minato-Ku, Tokyo 105-0011 Japan www.fkkasei.co.jp

Note: FUJIHARD HH2540U, FUJIHARD HH3372U, FUJIHARD HH3401U and FUJIHARD HH3482U were tested

on HL6157 clear only

Note: FUJIHARD HH3401U is only acceptable in 1.6, 2.3 and 3.2 mm thicknesses

(Coating information continued on the next page)



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Information on UVHC3000, UVHC5000, UVHC5000K, UVHC5000K1, UVHC5000K2 hard coat may be obtained by writing to the following address:

Momentive Performance Materials GmbH Building V7 51368 Leverkusen Germany Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12118 www.momentive.com



Information on UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8 and UVT820 coatings may be obtained by writing to the following address:

PAINT & VARNISH COMPANY, INC.

Red Spot Paint & Varnish Co., Inc. P.O. Box 418 Evansville, IN 47703-0418 www.redspot.com

Note: Red Spot UVT610V1, UVT610V2, UVT610V3, UVT610V4, UVT610V5, UVT610V6, UVT610V7, UVT610V8, UVT820V2, UVT820V3, UVT820V4, UVT820V5, UVT820V6, UVT820V7 and UVT820V8 was tested on clear HL6157.

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Appendix A: AMECA Accredited Laboratory Information

Arizona Desert Testing 21212 West Patton Road Wittman, Arizona 85361 **Tel**: (623) 388-9500 **FAX**: (623) 388-9007

Website: www.aztest.com

Atlas Weathering Services Group DSET Laboratories 45601 N. 47th Avenue Phoenix, Arizona 85027-7042 **Tel**: (623) 465-7356; (800) 255-DSET

FAX: (623) 465-9409

Website: www.atlas-mts.com

Q-Lab Arizona Test Services 24742 West Durango Street Buckeye, Arizona 85326 **Tel**: (623) 386-5140

FAX: (623) 386-5143 **Website:** <u>www.q-lab.com</u>

Atlas Weathering Services Group South Florida Test Services Everglades Division 16100 S.W. 216th Street Miami, Florida 33170

Tel: (305) 245-3659 FAX: (305) 245-9122

Website: www.atlas-mts.com

Q-Lab Florida Test Services and 1005 S.W. 18th Avenue, P.O. Box 349490

Homestead, Florida 33034 **Tel**: (305) 245-5600 **FAX**: (305) 245-5656 **Website**: www.q-lab.com

Definitions in FMVSS 108

Coated materials means a material which has a coating applied to the surface of the finished sample to impart some protective properties. Coating identification means a mark of the manufacturer's name, formulation designation number, and recommendations for application.

Color Fundamental definitions of color are expressed by Chromaticity Coordinates according to the CIE 1931 Standard Colorimetric System, as described in the CIE 1931 Chromaticity Diagram (incorporated by reference, see § 571.5).

Color bleeding means the migration of color out of a plastic part onto the surrounding surface.

Cracking means a separation of adjacent sections of a plastic material with penetration into the specimen.

Crazing means a network of apparent fine cracks on or beneath the surface of materials.

Exposed means material used in lenses or optical devices exposed to direct sunlight as installed on the vehicle.

Excerpts from Section 14 from FMVSS 108

Plastic and Coating Requirements

S14.1.2 Plastic optical materials. All plastic materials used for optical parts such as lenses and reflectors on lamps or reflective devices required or allowed by this standard must conform to the material test requirements of S14.4.2.

S14.1.3 All coatings used on optical materials must have added to their formulations an optical brightener, whose presence is detectable by ultraviolet light, to aid in testing for their presence. Other equivalent industry accepted methods may be used as an alternative.

Color Specifications

S14.4.1 *Color test.* The requirement applies to the overall effective color of light emitted by the device and not to the color of the light from a small area of the lens. It does not apply to any pilot, indicator, or tell-tale lights. The color of the sample device must comply when tested by either the Visual Method or the Tristimulus Method.

S14.4.1.3 Visual method.

S14.4.1.3.1 *Visual method procedure.* The color of light from the sample device must be compared visually with the color of the light from a standard. The standard may consist of a filter or limit glass. In the case of white, CIE Source A is used only as a color reference. The chromaticity coordinates of the color standards must be as close as possible to the limits listed. The color of the standard filters is determined spectro-photometrically.

S14.4.1.3.2 *Visual method performance requirements.* The color must comply with the applicable requirement. S14.4.1.3.2.1 *Red.* Red is not acceptable if it is less saturated (paler), yellower, or bluer than the limit standards.

S14.4.1.3.2.2 *Yellow (Amber)*. Yellow is not acceptable if it is less saturated (paler), greener, or redder than the limit standards.

S14.4.1.3.2.3 White. White is not acceptable if its color differs materially from that of CIE Source A.

S14.4.1.3.2.4 Green. Green is not acceptable if it is less saturated (paler), yellower, or bluer than the limit standards.

S14.4.1.3.2.5 Blue. Blue is not acceptable if it is less saturated (paler), greener, or redder than the limit standards.

S14.4.1.4 Tristimulus method.

S14.4.1.4.1 Tristimulus method procedure.

S14.4.1.4.1.1 The color of light from the H–V point of a sample device must be measured by photoelectric receivers with spectral responses that approximate CIE standard spectral tristimulus valves.

S14.4.1.4.1.2 A sphere may be used to integrate light from a colored source provided that the color shift that results from the spectral selectivity of the sphere paint be corrected by the use of a filter, correction factor, or an appropriate calibration.

S14.4.1.3 Where the sample device does not have uniform spectral characteristics in all useful directions, color measurements must be made at as many directions of view as are required to evaluate the color for those directions that apply to the end use of the device.

S14.4.1.4.2 *Tristimulus method performance requirements*. The color must comply with the applicable requirement.

S14.4.1.4.2.1 *Red.* The color of light emitted must fall within the following boundaries:

y = 0.33 (yellow boundary)

y = 0.98 - x (purple boundary)

S14.4.1.4.2.2 *Yellow (Amber)*. The color of light emitted must fall within the following boundaries:

y = 0.39 (red boundary)

y = 0.79 - 0.67x (white boundary)

y = x - 0.12 (green boundary)

S14.4.1.4.2.3 White (achromatic). The color of light emitted must fall within the following boundaries:

x = 0.31 (blue boundary)

y = 0.44 (green boundary)

x = 0.50 (yellow boundary)

y = 0.15 + 0.64x (green boundary)

```
y = 0.38 (red boundary)
y = 0.05 + 0.75x (purple boundary)
S14.4.1.4.2.4 Green. The color of light
```

S14.4.1.4.2.4 Green. The color of light emitted must fall within the following boundaries:

```
y = 0.73 - 0.73x (yellow boundary)

x = 0.63y - 0.04 (white boundary)

y = 0.50 - 0.50x (blue boundary)
```

S14.4.1.4.2.5 Restricted Blue. The color of light emitted must fall within the following boundaries:

```
y = 0.07 + 0.81x (green boundary)

x = 0.40 - y (white boundary)

x = 0.13 + 0.60y (violet boundary)
```

\$14.4.1.4.2.6 Signal Blue. The color of light emitted must fall within the following boundaries:

S14.4.1.4.2.6 Signal Blue. The coly = 0.32 (green boundary) x = 0.16 (white boundary) x = 0.40 - y (white boundary) x = 0.13 + 0.60y (violet boundary)

Plastic optical materials tests

S14.4.2 Plastic optical materials tests. Accelerated weathering procedures are not permitted.

S14.4.2.1 Samples.

S14.4.2.1.1 Samples of materials shall be injection molded into polished metal molds to produce test specimens with two flat and parallel faces. Alternative techniques may be used to produce equivalent specimens.

S14.4.2.1.2 Test specimens shape may vary, but each exposed surface must contain a minimum uninterrupted area of 32 sq cm.

S14.4.2.1.3 Samples must be furnished in thicknesses of 1.6 +/- 0.25 mm, 2.3 +/- 0.25 mm, 3.2 +/- 0.25 mm, and 6.4 +/- 0.25 mm. S14.4.2.1.4 All samples must conform to the applicable color test requirement of this standard prior to testing.

S14.4.2.1.5 A control sample, kept properly protected from influences which may change its appearance and properties of each thickness, must be retained.

S14.4.2.2 Outdoor exposure test.

S14.4.2.2.1 Outdoor exposure tests of 3 years in duration must be made on samples of all materials, including coated and uncoated versions, used for optical parts of devices covered by this standard. Tests are to be conducted in Florida and Arizona.

S14.4.2.2.2 Concentrations of polymer components and additives used in plastic materials may be changed without outdoor exposure testing provided the changes are within the limits of composition represented by higher and lower

concentrations of these polymer components and additives previously tested to this section and found to meet its requirements.

S14.4.2.2.3 Procedure. S14.4.2.2.3.1 One sample of each thickness of each material must be mounted at each exposure site so that at least a minimum uninterrupted area of 32 sq cm of the exposed upper surface of the sample is at an angle of 45 degrees to the horizontal facing south. The sample must be mounted in the open no closer than 30 cm (11.8 in) to its background.

S14.4.2.2.3.2 During the exposure time the samples must be cleaned once every three months by washing with mild soap or detergent and water, and then rinsing with distilled water. Rubbing must be avoided.

S14.4.2.2.4 *Performance requirements*. Plastic lenses, other than those incorporating reflex reflectors, used for inner lenses or those covered by another material and not exposed directly to sunlight must meet the optical material test requirements when covered by the outer lens or other material.

S14.4.2.2.4.1 After completion of the outdoor exposure test the haze and loss of surface luster as measured by ASTM D1003–92 (incorporated by reference, see § 571.5) must not be greater than:

- (a) 30% for materials used for outer lenses, other than those incorporating reflex reflectors;
- (b) 7% for materials used for reflex reflectors and lenses used in front of reflex reflectors.

S14.4.2.2.4.2 After completion of the outdoor exposure test materials used for headlamp lenses must show no deterioration.

S14.4.2.2.4.3 After completion of the outdoor exposure test all materials, when compared with the unexposed control samples, must not show physical changes affecting performance such as color bleeding, delamination, crazing, or cracking. Additionally materials used for reflex reflectors and lenses used in front of reflex reflectors must not show surface deterioration or dimensional changes.

S14.4.2.2.4.4 After completion of the outdoor exposure test all materials, when compared with the unexposed control samples, must not have their luminous transmittance changed by more than 25% when tested in accordance with ASTM E308–66 (incorporated by reference, see § 571.5) using CIE Illuminant A (2856K). S14.4.2.2.4.5 After completion of the outdoor exposure test all materials must conform to the color test of this standard in the range of thickness stated by the material manufacturer.

S14.4.2.3 Heat test.

S14.4.2.3.1 *Procedure.* Two samples of each thickness of each material must be supported at the bottom, with at least 51 mm of the sample above the support, in the vertical position in such a manner that, on each side, the minimum uninterrupted area of exposed surface is not less than 3225 sq mm. The samples are placed in a circulating air oven at 79 Degrees +/- 3 Degrees for Two hours.

S14.4.2.3.2 Performance requirements.

After completion of the heat exposure and cooling to room ambient temperature, a test specimen must show no change in shape and general appearance discernable to the naked eye when compared with an unexposed specimen and continue to conform to the applicable color test requirement of this standard.

Appendix C: DOT Interpretation Files and Supplemental Lab Information	



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(54) HARD-COAT INFUSED POLYCARBONATE HEADLAMP LENS AND RELATED METHOD

(71) Applicant: FORD GLOBAL TECHNOLOGIES,

LLC, Dearborn, MI (US)

(72) Inventors: Paul Kenneth Dellock, Northville, MI

(US); Talat Karmo, Waterford, MI (US); Stuart C. Salter, White Lake, MI (US); Arsen Terjimanian, Troy, MI (US); Joseph Myszka, Livonia, MI (US)

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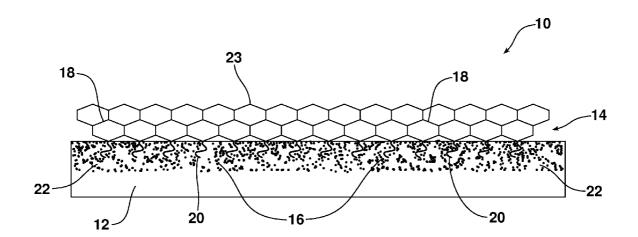
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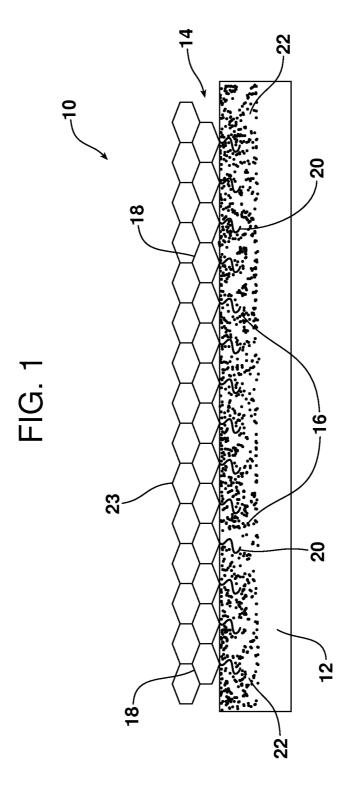
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(57) ABSTRACT

A headlamp lens includes a polycarbonate substrate and an infused protective skin covering on at least one surface of the polycarbonate substrate.





HARD-COAT INFUSED POLYCARBONATE HEADLAMP LENS AND RELATED METHOD

[0001] This application claims the benefit of U.S. provisional patent application Ser. No. 62/086,965 filed on 3 Dec. 2014, the full disclosure of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] This document relates generally to the vehicle equipment field and, more particularly, to a hard-coat infused polycarbonate lens that is less expensive to produce and provides better performance including, particularly, better resistance to UV degradation over time so as to remain clear for the free passage of light for the life of the vehicle.

BACKGROUND

[0003] Currently, headlamp lenses are molded from optically clear polycarbonate. In order to protect the headlamp lenses from both abrasion and ultraviolet (UV) weathering degradation, a clear silica hard-coat and anti-UV additives are applied to the forward surface of the headlamp. Silica hard-coated polycarbonate headlamp lenses provide excellent resistance to scratches and excellent impact performance. However, silica hard-coated polycarbonate headlamp lenses suffer a number of drawbacks.

[0004] More specifically, the silica hard-coating process is very expensive and typically requires large facility expense in order to implement. Further, exposure to UV radiation from the rays of the sun attacks both the coating and the lens base polycarbonate substrate. Current state-of-the-art UV protection lasts up to 3000 hours of accelerated weathering. However, it should be appreciated that many vehicles including, for example, those in the Sun Belt areas of the United States are exposed to substantial UV radiation that, over time, breaks down the substrate leading to yellowing and clouding which reduces headlamp performance. Further, as the UV rays of the sun degrade the substrate, the silica hard-coat may delaminate from the polycarbonate substrate accelerating the substrate degradation. This also leads to degradation of the impact performance of the lens. Still further, the hard-coat process relies upon volatile organic compounds (VOCs) which are an environmental concern.

[0005] This document relates to a new and improved method that provides similar or improved scratch resistance and significantly better UV performance than found in current polycarbonate headlamp lenses. As a result, impact resistance and clarity may be better maintained for the life of the vehicle. Further, the method utilized to provide this increased performance is more affordable than and does not release VOCs into the atmosphere like the prior art process.

SUMMARY

[0006] In accordance with the purposes and benefits described herein, a headlamp lens is provided. That headlamp lens comprises a polycarbonate substrate and an infused protective skin covering at least one surface of the polycarbonate substrate.

[0007] In one possible embodiment, the infused protective skin includes a scratch-resistant agent and a UV inhibitor. In one possible embodiment, the scratch-resistant agent is silicone-based. In one possible embodiment, the scratch-resistant agent is selected from a group of materials consisting of

vinyl (mono-, di- and tri-alkoxysilanes), phenyl (mono-, diand tri-alkoxysilanes), diphenyldialkoxysilanes, vinyltrialkoxysilanes, and other silicone-based molecules and mixtures thereof.

[0008] In one possible embodiment, the UV inhibitor is selected from a group of materials consisting of benzophenone, a benzotriazole and mixtures thereof. Still further, in one possible embodiment, the infused protective skin further includes a UV stabilizer. In one possible embodiment, that UV stabilizer may be a hindered amine light stabilizer.

[0009] Still further, the polycarbonate substrate in any embodiment may include a plurality of pores. Further, the scratch-resistant agent may comprise silicon-based molecules having relatively large heads and relatively narrow tails wherein the heads rest on a surface of the substrate overlying the pores and the tails penetrate the pores and act as an anchor for the heads.

[0010] In accordance with an additional aspect, a method is provided of manufacturing a polycarbonate headlamp lens with an infused skin providing scratch resistance and UV protection. That method may be described as comprising the steps of molding the headlamp lens substrate from polycarbonate material, cleaning the polycarbonate substrate following molding and infusing a surface of the polycarbonate substrate with a protective skin to produce polycarbonate infused headlamp lenses. This is then followed by rinsing and drying the lenses.

[0011] In one possible embodiment, the method further includes increasing the thickness of the protective skin following infusing. In one possible embodiment, this is done by chemically enhanced physical vapor deposition.

[0012] In one possible embodiment, the method includes incorporating a scratch resistant agent and a UV inhibitor in the protective skin. That scratch resistant agent may be selected from a group of materials consisting of vinyl (mono-, di- and tri-alkoxysilanes), phenyl (mono-, di- and tri-alkoxysilanes), diphenyldialkoxysilanes, vinyltrimethoxysilanes, other silicone-based molecules and mixtures thereof. Further, the method may include selecting the UV inhibitors from a group of materials consisting of benzophenone, a benzotriazole, other UV inhibitor compounds and mixtures thereof. Further, the method may include incorporating one or more UV stabilizers in the protective skin.

[0013] In one possible embodiment, the method includes cooling the headlamp lens substrate after molding and prior to cleaning to a temperature between 65° C. and room temperature. Further, the method includes infusing by dipping the substrate into an infusion tank including an infusion solution bath for a period of time between 10 to 60 seconds at a temperature between 65-90° C. so as to open pores in the substrate to allow superficial infusion of the protective skin to the substrate. In one possible embodiment, the scratch resistant agent and the UV inhibitor are infused in a single step. In another possible embodiment, the scratch resistant agent and the UV inhibitor are infused in multiple steps for the purposes of building up the desired thickness of the hard coating. In addition, the method may include the step of performing a scratch resistance test to select infused lenses and adjusting the concentration of additives in the infusion solution bath as required until the desired results are achieved.

[0014] In the following description there are shown and described several preferred embodiments of the headlamp lens. As should be realized, the headlamp lens is capable of other, different embodiments and its several details are

capable of modification in various, obvious aspects, all without departing from the headlamp lens as described in the following claims.

[0015] Accordingly, the drawings and descriptions should be regarded as illustrative in nature and not as restrictive.

BRIEF DESCRIPTION OF THE DRAWING FIGURE

[0016] The accompanying drawing figure incorporated herein and forming a part of the specification, illustrates several aspects of the infused headlamp lens and together with the description serves to explain certain principles thereof.

[0017] FIG. 1 is a schematic representation of the polycarbonate lens with an infused protective coating.

[0018] Reference will now be made in detail to the present preferred embodiments of the headlamp lens, an example of which is illustrated in the accompanying drawing figure.

DETAILED DESCRIPTION

[0019] Reference is now made to FIG. 1 illustrating the headlamp lens 10. That headlamp lens 10 comprises a polycarbonate substrate 12 and an infused protective skin 14 covering at least one surface (i.e. the forward surface) of the polycarbonate substrate and an optional PECVD (Plasma Enhanced Chemical Vapor Deposition) build-up.

[0020] In one embodiment, the infused protective skin 14 includes a scratch resistance agent and a UV inhibitor. In one possible embodiment, the scratch resistance agent is silicone-based. Such a scratch resistance agent may be selected from a group of materials consisting of vinyl (mono-, di- and tri-alkoxysilanes), phenyl (mono-, di- and tri-alkoxysilanes), diphenyldialkoxysilanes, vinyltrimethoxysilanes, and other silicone-based molecules and mixtures thereof.

[0021] In one embodiment the UV inhibitor is selected from a group of materials consisting of a benzophenone, a benzotriazole, or other compounds like hydroxyphenyltriazines and mixtures thereof. Further, in one possible embodiment the infused protective skin further includes one or more UV stabilizers. The UV stabilizer may take the form of a hindered amine light stabilizer.

[0022] As illustrated in FIG. 1, in any of the embodiments the polycarbonate substrate 12 includes a plurality of pores 16. In one possible embodiment, the scratch resistance agent comprises silicone-based molecules having relatively large heads 18 and relatively narrow tails 20 wherein the heads rest on a surface of the substrate 12 overlying the pores 16 so as to provide a hard, impact resistant protective coating while the tails 20 penetrate the pores and act as an anchor for the heads. Advantageously, this structure provides a chemical bond between the infused protective skin 14 and the polycarbonate substrate 12 that is (a) far superior to and (b) resists the delamination characteristic of mechanically bonded hardcoats provided on headlamp lenses made in accordance with methods known in the art. It also serves to seal in the UV inhibitor 22 that has penetrated and been deposited deep in other pores 16.

[0023] In accordance with an additional aspect, a method is provided for manufacturing a polycarbonate headlamp lens 10 having a polycarbonate substrate 12 and an infused skin 14 providing scratch resistance and UV protection. That method may be broadly described as comprising the steps of molding the headlamp lens substrate 12 from the polycarbonate mate-

rial, cleaning the polycarbonate substrate following molding, infusing a surface of the polycarbonate substrate with a protective skin 14 and adding an optional PECVD layer 23 to produce an infused headlamp lens 10, rinsing the lens and drying the lens. The method may also include incorporating a scratch resistance agent and a UV inhibitor in the protective skin 14. Further, the method may include selecting a scratch resistance agent from a group of materials consisting of vinyl (mono-, di- and tri-alkoxysilanes), phenyl (mono-, di- and tri-alkoxysilanes), diphenyldialkoxysilanes, vinyltrimethoxysilanes, and other silicone-based molecules and mixtures thereof.

[0024] In addition the method may include the selecting of the UV inhibitor from a group of materials consisting of a benzophenone, a benzotriazole, other compounds like hydroxyphenyltriazines and mixtures thereof. Further the method may include incorporating a UV stabilizer in the protective skin 14.

[0025] Still more specifically, the method may include cooling the headlamp lens substrate 12 after molding and prior to cleaning to a temperature of between 65° C. and room temperature. Further the infusing step may include dipping the substrate 12 into an infusion tank including an infusion solution bath for a period of time of between 10 to 60 seconds at a temperature between 65-90° C. so as to open the pores 16 in the substrate to allow superficial infusion of the protective skin 14 into the substrate. In one possible embodiment, the scratch resistance agent and the UV inhibitor are infused in a single step. In another possible embodiment, the scratch resistance agent and the UV inhibitor are infused in multiple steps. In another embodiment, the method includes performing a scratch resistance test to selected infused lenses and adjusting the concentrations of additives in the infusion solution bath as required until the desired results are achieved.

[0026] Another embodiment is to increase the depth of the silica layer by using an additional deposition process such as PECVD or other deposition process.

[0027] In yet another embodiment, the thickness of the infused skin may be further increased by appropriate physical or chemical conditioning or both. A potential way of achieving this is by chemically enhanced physical vapor deposition (CEPVD). In this technique, the infused polycarbonate is placed inside a chamber where silica and related siliconbased compounds (precursors) are ionized and vaporized under partial vacuum at moderate or near ambient temperatures and the vapors are allowed to deposit and condense onto the infused polycarbonate. Final hard coating thicknesses are controlled by the selection of the type of precursor and the chamber time/temperature/vacuum pressure to which the polycarbonate is exposed. In one possible embodiment, the thickness of the infused protection skin is between 1 and 10 microns. In another possible embodiment the protective skin has a thickness of about 7 microns. Where CEPVD is used to increase the thickness of the protective skin, the infused silica surface is receptive to chemical bonding and physical binding with the vaporized silica and related silicon-based compounds to provide a hard, scratch resistant layer.

[0028] In one possible embodiment, the polycarbonate headlamp lens substrate may be removed from the molding tool using an overhead conveyor transport. The molded lens may then be cooled to a temperature between 65° C. and room temperature by air circulation or other means prior to cleaning. Cleaning may be completed by dipping the lens 10 into a

tank filled with distilled, deionized water for 10 to 30 seconds. That water is maintained at anywhere from room temperature to 65° C.

[0029] After cleaning, the lens is dipped into an infusion tank holding an infusion solution bath for from 10 to 60 seconds wherein the bath is held at 65 the 90° C. The bath opens the pores 16 in the surface of the substrate 12 to allow superficial infusion of the additives in the infusion solution to a depth of $0.1\text{-}10\mu$ or more as desired.

[0030] If the scratch resistance agent and the UV inhibitor are infused in a single step, the infusion solution bath includes an aqueous mixture of surface active agents including ionic and nonionic surfactants (emulsifiers). These surfactants hold two or more immiscible liquids, solids and mixtures in suspension. Proper emulsification is essential to the satisfactory performance of the carrier. Emulsifiers can be ionic (anionic, cationic, and amphoteric) and non-ionic.

[0031] Sodium stearate (a soap)—is an example of an anionic surfactant;

[0032] Trimethylhexadecyl ammonium bromide—is an example of a cationic surfactant;

[0033] Cocoamidopropylbentaine—is an example of an amphoteric surfactant; and

[0034] Polyethylene ethoxylate—is an example of a non-ionic surfactant.

[0035] Additional chemicals in the infusion solution bath may further include ethanol, other solvents, dispersants, plasticizers and leveling agents. If the scratch resistance agent and the UV inhibitor are infused in a single step, the infusion solution bath may further include hard coating materials based on the hard coating formula and the UV protection formula described below. In the event the scratch resistance agent and the UV inhibitor are to be infused in multiple steps, the first infusion path would include either the hard coating formula or the UV protection formula and a second infusion coating bath would include the other of the hard coating formula or UV protection formula.

[0036] For purposes of this document the hard coating formula may be described as comprising a number of silicone-based molecules that are suitable for the hard coating infusion of the polycarbonate lens 12. As previously noted, these may include vinyl (mono-, di- and tri-alkoxysilanes), phenyl (mono-, di- and tri-alkoxysilanes), diphenyldialkoxysilanes, vinyltrimethoxysilane, other silicone-based molecules and mixtures thereof. Such molecules have long chain organic tails 20 that are able to penetrate the polycarbonate pores 16 and act as chemical anchor sites.

[0037] For purposes of this document the UV protection formula may be described as including UV absorbers based on conjugated compounds (containing double bonds) that absorb the UV radiation and re-emit it in the lower energy infrared range. These include benzophenones and benzotriazoles. Additionally, the UV protection, may include UV stabilizers. One of the most effective and important stabilizers are the hindered amine light stabilizers (HALS). Rather than simply absorbing the light energy, these stabilizers work by interrupting the photo degradation process before it can get destructively underway. The mechanisms used include "free radical scavenging", "peroxide decomposition" as well as energy absorption.

[0038] With the exception for water and alcohol, concentrations of the various chemicals may range from 0.01% to 10% each by weight or by volume. Concentrations of water and alcohol can range from 10 to 90% by volume.

[0039] Rinsing of the lens following infusion may comprise dipping the lens 10 in a second rinse tank of distilled ionized water for 10 to 30 seconds that has a temperature anywhere from room temperature to 65° C. The lens 10 is then removed from the tank and air dried such as by means of a drying fan. After performing any necessary scratch resistance testing on a selected test sample specimen, the remaining lenses 10 in the group of lenses being manufactured together are packaged for shipment. As should be appreciated all the steps may be performed by utilizing a robotic system with precise timing and sequencing protocol. Further, it should be appreciated that the headlamp lenses 10 may be infused at the molding site or at a remote facility any time after molding.

[0040] The foregoing has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the embodiments to the precise form disclosed. Obvious modifications and variations are possible in light of the above teachings. All such modifications and variations are within the scope of the appended claims when interpreted in accordance with the breadth to which they are fairly, legally and equitably entitled.

What is claimed:

- 1. A headlamp lens, comprising:
- a polycarbonate substrate; and
- an infused protective skin covering at least one surface of said polycarbonate substrate.
- 2. The lens of claim 1, wherein said infused protective skin includes a scratch resistance agent and a UV inhibitor.
- 3. The lens of claim 2, wherein said scratch resistance agent is silicone based.
- **4.** The lens of claim **3**, wherein said scratch resistance agent is selected from a group of materials consisting of vinyl (mono-, di- and tri-alkoxysilanes), phenyl (mono-, di- and tri-alkoxysilanes), diphenyldialkoxysilanes, vinyltrimethoxysilane, other silicone-based molecules and mixtures thereof.
- **5**. The lens of claim **4**, wherein said UV inhibitor is selected from a group of materials consisting of a benzophenone, a benzotriazole, a hydroxyphenyltriazine, and mixtures thereof
- **6**. The lens of claim **5**, wherein said infused protective skin further includes a UV stabilizer.
- 7. The lens of claim 6, wherein said UV stabilizer is a hindered amine light stabilizer.
- **8**. The lens of claim **3**, wherein said polycarbonate substrate includes a plurality of pores.
- 9. The lens of claim 8, wherein said scratch resistance agent comprises silicone based molecules having relatively large heads and relatively narrow tails wherein said heads rest on a surface of said substrate overlying said pores and said tails penetrate said pores and act as an anchor for said heads.
- 10. A method of manufacturing a polycarbonate headlamp lens with an infused skin providing scratch resistance and UV protection, comprising:

molding said headlamp lens substrate from polycarbonate material:

cleaning said polycarbonate substrate following molding; infusing a surface of polycarbonate substrate with a protective skin to produce polycarbonate infused headlamp lens:

rinsing said lens; and

drying said lens.

11. The method of claim 10, further including increasing thickness of said protective skin following infusing.

- 12. The method of claim 11, including increasing thickness of said protective skin by chemically enhanced physical vapor deposition.
- 13. The method of claim 11, including incorporating a scratch resistance agent and a UV inhibitor in said protective skin
- 14. The method of claim 13, including selecting said scratch resistance agent from a group of materials consisting of vinyl (mono-, di- and tri-alkoxysilanes), phenyl (mono-, di- and tri-alkoxysilanes), diphenyldialkoxysilanes, vinyltrimethoxysilanes, and other silicone-based molecules and mixtures thereof.
- **15**. The method of claim **14**, including selecting said UV inhibitors from a group of materials consisting of a benzophenone, a benzotriazole, a hydroxyphenyltriazine, and other UV inhibitor compounds and mixtures thereof.
- 16. The method of claim 15, including incorporating a UV stabilizer in said protective skin.

- 17. The method of claim 11, further including cooling said headlamp lens substrate after molding and prior to cleaning to a temperature between 65° C. and room temperature.
- 18. The method of claim 13, wherein infusing includes dipping said substrate into an infusion tank including an infusion solution bath for a period of time of between 10-60 seconds at a temperature of between 65-90° C. so as to open pores in said substrate to allow superficial infusion of said protective skin into said substrate.
- 19. The method of claim 18, wherein said scratch resistance agent and said UV inhibitor are infused in (a) a single step or (b) in multiple steps for the purposes of building up the desired thickness of the hard coating.
- 20. The method of claim 18, including performing a scratch resistance test to selected infused lenses and adjusting concentration of additives in said infusion solution bath as required until desired results are achieved.

* * * * *

Mr. Shigeyoshi Aihara
Project Manager
Regulation and Compliance
Engineering Administration Department
Ichikoh Industries, Ltd.
80 Itado Ishehara City
Kanagawa Pref.
250-1192 Japan

Dear Mr. Aihara:

This is in reply to your letter of June 10, 1999, presented at a meeting with NHTSA representatives that day, asking for an interpretation of S5.1.2 of Federal Motor Vehicle Safety Standard No. 108. I am sorry that we were unable to provide you a response by July 6 as you requested in your letter of June 28 to Taylor Vinson of this Office.

Your company has developed a new rear turn signal lamp, consisting of an outer plastic lens, an inner cap, and an uncolored filament bulb. The color of the lens is "pale (light) pink color, and, this plastic material complies with the requirements of SAE J576c . . . excluding the color requirement." You tell us that the trichromaticity coordinates of the plastic material used in the outer lens do not fall within either the red or the white areas of the chromaticity chart of SAE J578c. However, when illuminated, the lamp provides an amber color that fall within the coordinates specified in SAE J578c. You have asked whether this design is acceptable under S5.1.2 relating to plastic materials used in optical parts of motor vehicle lighting devices.

Although this does not affect our answer to your question, please note, in Standard No. 108, that SAE Recommended Practice J576c of 1970 has been replaced by SAE J576 JUL91 as the applicable standard for plastic materials used in lighting devices. However, J578c remains the Federal standard for color.

We regret to inform you that this design is not acceptable. Although S1, *Scope*, of SAE J578c states that "The specification applies to the overall effective color of light emitted by the device," regardless of the color of its lens, both SAE J576 JUL91 and Standard No. 108 apply the color requirement to plastic components of lamps as well. S5.1.2(e) of Standard No. 108 requires the trichromatic coordinates of the plastic samples, tested according to that paragraph, to conform to the requirements of SAE J578c. Paragraphs 4.1 and 4.2.2 of SAE J576 JUL91 also require conformance of plastic samples to the chromaticity coordinate requirements of SAE J578c. This standard specifies color coordinates only for red, white, yellow (amber), green, and blue. Because the lens of your lamp does not meet any of the coordinates of SAE J578c, Standard No. 108 does not permit its use.

At the meeting, we noted that the iner lens was a greenish color. It, too, must comply with the color coordinate requirements of paragraphs 4.1 and 4.2.2 of SAE J576 JUL91.

At that time, you also asked if it were acceptable to use a plastic fabricated from the mix of two resins, each of which complied with the requirements of SAE J576. You cannot assume, when two complying resins are blended, that the resulting plastic will also comply with SAE J576 JUL91, and we recommend that you test the blended plastic to ensure that it meets all the specifications of S5.1.2 and SAE J576 JUL91. This would be the case whether it was the intent to create a new color, or whether the rejected molded parts are reground and plastics of differing compositions are mixed and recycled into newly-molded lamp lenses. As we said in the preamble to the 1995 final rule amending S5.1.2, "it is incumbent upon the vehicle or equipment manufacturer . . . not to change the composition of the plastics materials [obtained from the plastics manufacturer] in a manner that would cause it to be noncomplying." 60 FR 46066, copy enclosed.

1 of 2 11/12/2010 5:37 AM

Sincerely, Frank Seales, Jr. Chief Counsel Enclosure ref:108 d.8/27/99

2 of 2

Korlo

SHIZUOKA WORKS 500, KITAWAKI SHIMIZU-SHI, SHIZUOKA-KEN JAPAN TEL NO. 0543-45-2573 FAX NO. 0543-45-3437 KOITO MANUFACTURING CO., LTD.

MAKERS CONTRACTORS

KETS

A 11: 27

HEAD OFFICE 4-8-3, TAKANAWA MINATO-KU TOKYO JAPAN TEL NO. 03-3443-7111 FAX NO. 03-3447-1520

4 August, 2005

U.S. Dept. of Transportation NHTSA Office of the Chief Counsel 400 seventh Street SW Washington DC 20590 MT3A-05-22709-2

DEMI: OF THANSPORTATION

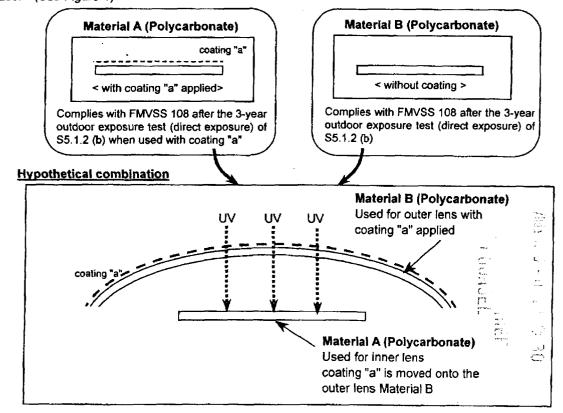
Request for Interpretation: Necessity of carrying out a 3-year outdoor exposure test

Dear Sir:

Koito would like to thank you in advance for your consideration of our request for an interpretation and clarification of the Federal Motor Vehicle Safety Standard (FMVSS) No.108 concerning the necessity of carrying out a 3-year outdoor exposure test in a certain combination of plastic and coating material as explained below.

<u>The Question:</u> Necessity of carrying out a 3-year outdoor exposure test when "material A", which is suitable for direct exposure of FMVSS108 S5.1.2 (b), is used with a covering lens "material B", also suitable for direct exposure of FMVSS108 S5.1.2 (b), and a coating material "a" which was originally on the exterior surface of "material A" is moved to the exterior surface of "material B".

We are contemplating a new combination of plastic lens and coating material for use in an inner lens optics of automotive lamps. In this hypothetical new combination, "material A" (polycarbonate), which is suitable for direct exposure of FMVSS108 S5.1.2 (b) after completion of the 3-year outdoor exposure test when used with coating material "a", is going to be used in the inner lens. "Material B" (polycarbonate), which is also suitable for direct exposure of FMVSS108 S5.1.2 (b), but without coating, is going to be used in the outer lens. Despite that both materials meet FMVSS108 S5.1.2(b) in direct exposure condition, coating material "a" which was originally on the exterior surface of the inner lens "material A" when performing a 3-year exposure test is going to be moved onto the exterior surface of the outer lens "material B", and material A loses the coating "a" from its own surface. (See Figure-1)



We construe that no further testing of this hypothetical material / coating combination is required for the evaluation of the cumulative haze. Inner lens "material A" is still used with the coating material "a", although the coating itself is moved onto the exterior surface of the outer lens "material B". Also, in view of the vast reduction in ultraviolet exposure of inner lens which is afforded by the outer lens "material B", the inner lens "material A" would experience negligible haze when protected by an outer lens. This will further support the argument that haze performance of this material / coating combination is already ensured by the direct exposure of both materials A and B which were confirmed satisfactory to the FMVSS108 S5.1.2 (b) criteria after completion of the 3-year outdoor exposure tests.

Koito Manufacturing thanks you in advance for your early confirmation on this matter.

Sincerely,

Kiminori Hyodo

Deputy General Manager, Regulation & Certification

Koito Manufacturing Co., Ltd.



U.S. Department of Transportation

National Highway Traffic Safety Administration DEPT. OF TRANSPORTATION DOCKETS

2005 OCT 12 A 11: 27

OCT - 4 2005

Docket SVC 124 Stal 108

> 400 Seventh St., S.W. Washington, D.C. 20590

MXBA-05-22709-1

Mr. Kiminori Hyodo Deputy General Manager, Regulations & Certification Koito Manufacturing Co., Ltd. 4-8-3, Takanawa Minato-ku Tokyo Japan

Dear Mr. Hyodo:

This responds to your recent letter, in which you asked whether it would be necessary to carry out a three-year, outdoor exposure test on a new combination of plastic lens and coating material under Federal Motor Vehicle Safety Standard (FMVSS) No. 108, Lamps, Reflective Devices, and Associated Equipment. Specifically, your letter stated that you plan to use two existing types of polycarbonate materials, each of which independently meets the requirements of S5.1.2 of Standard No. 108 (i.e., Material A with a coating, and Material B without a coating). However, we understand that you now intend to combine these materials, such that Material A is used as an inner lens without a coating, and Material B is used as an outer lens with the same coating that had been applied to Material A. In response to your question, FMVSS No. 108 does not specifically require manufacturers to conduct testing, but it is the manufacturer's responsibility to produce a product that complies with all applicable requirements of our standard when tested in accordance with the standard, and to properly certify compliance.

By way of background, the National Highway Traffic Safety Administration (NHTSA) is authorized to issue FMVSSs that set performance requirements for new motor vehicles and items of motor vehicle equipment. NHTSA does not provide approval of motor vehicles or motor vehicle equipment. Instead, it is the responsibility of manufacturers to self-certify that their products conform to all applicable safety standards that are in effect on the date of manufacture (see 49 U.S.C. 30115 and 49 CFR Part 567, Certification).

We note further that the agency's safety standards specify the test conditions and procedures that NHTSA will use to evaluate the performance of the vehicle or equipment being tested for compliance with the particular safety standard. NHTSA follows the test procedures and conditions applicable and in effect at the time of certification when conducting its compliance testing.





A manufacturer is responsible for ensuring that its product complies with applicable standards when tested in accordance with NHTSA procedures. A manufacturer may choose a valid means other than NHTSA performance test procedures for evaluating its products to determine whether the vehicle or equipment will comply with the safety standards when tested by the agency according to the procedures specified by the standard and to provide a basis for its certification of compliance.

If the agency has reason to believe that an apparent noncompliance exists in a vehicle or item of motor vehicle equipment, the manufacturer is asked to show the basis for its certification that the vehicle or equipment complies with the relevant safety standard(s). If in fact the vehicle or equipment does not comply with a Federal motor vehicle safety standard when tested according to procedures specified by the standard, the manufacturer will have to recall the product to bring it into compliance at no charge to the customer.

In addition, the manufacturer will be subject to civil penalties, unless it can establish that it had no reason to know, despite exercising "reasonable care" in the design and manufacture of the product to ensure compliance, that the product did not in fact comply with the safety standard(s) (49 U.S.C. 30115(a) and 30165). This agency has long said that it is unable to judge what efforts would constitute "reasonable care" in advance of the actual circumstances in which a noncompliance occurs.

As you are aware, the requirements for lighting equipment are contained in FMVSS No. 108, which provides in relevant part:

- S5.1.2 Plastic materials used for optical parts such as lenses and reflectors shall conform to SAE Recommended Practice J576 [Society of Automotive Engineers (SAE) Recommended Practice J576, Plastic Materials for Use in Optical Parts Such as Lenses and Reflex Reflectors of Motor Vehicle Lighting Devices] JUL91, except that:
- (a) Plastic lenses (other than those incorporating reflex reflectors) used for inner lenses or those covered by another material and not exposed directly to sunlight shall meet the requirements of paragraphs 3.3 and 4.2 of SAE J576 JUL91 when covered by the outer lens or other material;

- (b) After the outdoor exposure test, the haze and loss of surface luster of plastic materials (other than those incorporating reflex reflectors) used for outer lenses shall not be greater than 30 percent haze as measured by ASTM D 1003-92, *Haze and Luminous Transmittance of Transparent Plastic*;
- (g) All outdoor exposure tests shall be 3 years in duration, whether the material is exposed or protected. Accelerated weathering procedures are not permitted.

We note that neither SAE J576 nor Standard No. 108 specifically requires use of a coating.

Thus, the standard sets forth the test that NHTSA follows in conducting compliance testing. Specifically, under SAE J576 (incorporated by reference in FMVSS No. 108), the agency will subject plastic materials used for optical parts to an unaccelerated, three-year outdoor exposure test.

In short, Koito must ensure that its lamps as manufactured conform to all applicable requirements of FMVSS No 108, including that the plastic materials meet the exposure test requirements under S5.1.2. Again, our standards do not compel manufacturers to test the motor vehicles or motor vehicle equipment that they produce under NHTSA's test procedures, although many choose to do so in order to provide a basis for their certification. However, if the agency subjected the lamp in question to compliance testing, the lamp's plastic materials would need to meet the requirements of FMVSS No. 108, as certified.

If you have further questions, please feel free to contact Eric Stas of my staff at this address or by telephone at (202) 366-2992.

Sincerely,

Stephen P. Wood Acting Chief Cours

Acting Chief Counse



RECEIVED NVS-215 American Honds Motor Co., In 1919 Torrance Bouleverd Torrance, CA 90501-2746 Phone (\$10) 783-2000

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May 27, 2004

OFFICE OF Defects investigation

Mr. Kenneth N. Weinstein,
Associate Administrator
Office of Safety Assurance
NATIONAL HIGHWAY TRAFFIC SAFETY
ADMINISTRATION
400 Seventh St., S.W.
Washington, DC 20590

(3paga)

Dear Mr. Weinstein:

On May 20, 2004, Honda Motor Co., Ltd. (HMC) determined the existence of a noncompliance with Federal Motor Vehicle Sefety Standard No. 108, "Lamps, Reflective Devices, and Associated Equipment" in the motor vehicles listed below. The following information is submitted pursuant to the requirements of 49 CFR 573.6.

573.6(c)(1)

Name of menufacturer:

Honda Motor Co., Ltd. (HMC)

Manufacturer's agent:

William R. Willen

American Honda Motor Co., Inc. (AHM)

1919 Torrance Blvd. Torrance, CA 90501-2746

Name of tall lamp manufacturer:

Kolto Manufacturing Co., Ltd.

573.8(c)(2)

identification of potentially affected vehicles:

Make/Model

Description

VIN/Dates of Manufacture

Honda 82000

Certain 2000 models

JHMAP114*Y7000049 - JHMAP114*YT007115

June 8, 1999 to April 5, 2000

Description of the basis for the determination of the recall population:

The 2000 model year was the introductory year of the \$2000. The affected lenses of the side marker (amp and side reflex reflector in the tall lamp assembly were identified based on manufacturing records. The VIN range and manufacturing dates are inclusive of all vehicles that could potentially have a noncomplying lens installed by the factory.

573.6(c)(3)

Total number of vehicles potentially affected:

7,067

573.6(c)(4)

Percentage of affected vehicles that contain the noncompliance:

Unknown

573.6(c)(5)

Noncompliance description:

Summary

The lens of the side marker lamp and side reflex reflector in the tall lamp assembly were manufactured with incorrect dye that, under the circumstances of use, does not retain its color over time and, therefore, does not comply with the requirements of Federal Motor Vehicle Safety Standard No. 108, "Lamps, Reflective Devices, and Associated Equipment."

Detel

The lens of the side marker lamp and side reflex reflector in the tall lamp assembly were manufactured using Diazole-base dye instead of Perinone-base dye. The chemical unit of Diazole-base dye, when used in the circumstances of the \$2000, is more susceptible to UV and high temperature decomposition. As a result, the red color could fade, which does not comply with the deterioration requirement of Federal Motor Vehicle Safety Standard No. 108, "Lamps, Reflective Devices, and Associated Equipment."

573.6(c)(7)

Determination of noncompliance:

On June 17, 2003, HMC received a report that the color of the tall lamp side market lens had faded. HMC initiated an investigation. According to Kolto's accelerated test, the lens was projected to comply with the deterioration requirement of FMVSS 108. On May 14, 2004, Honda and Kolto met with NHTSA to discuss compliance implications. In accordance with NHTSA's opinion, HMC determined the existence of a noncompliance.

573.6(c)(8)(i)

Program for remedying the noncompliance:

The owners of all affected vehicles will be notified by mail to take their vehicle to an authorized Honda dealer. The dealer will replace all affected tail lamp assemblies, free of charge.

573.6(c)(8)(II)

The estimated date to e-mail preliminary notification to dealers: Jun. 4, 2004

The estimated date to provide service bulletin to dealers: Jun. 18, 2004

The estimated date to begin sending notifications to owners: Jul. 7, 2004

The estimated date of completion of the notification: Jul. 7, 2004

573.6(c)(9)

Representative copies of all notices, builetins and other communications:

A copy of the dealer service bulletin and text of the final customer notification letter will be submitted to your office as soon as possible.

573.6(c)(10)

Proposed owner notification letter submission:

A draft of the owner notification letter will be submitted to your office as soon as possible.

Mr. Kenneth N. Weinstein May 27, 2004 Page 3

573.6(c)(11)

Manufacturer's campaign number:

The number will be submitted to your office as soon as possible.

R. De.

Sincerely,

AMERICAN HONDA MOTOR CO., INC.

William R. Willen Managing Counsel

Product Regulatory Office

WRW:ke

Weaverville is located within the prohibited co-channel minimum distance separation of 280.8 kilometers (174.5 miles) to the Sacramento-Stockton television market, one of the designated television markets affected by the Commission's current freeze on allotments and applications pending the outcome of an inquiry into the use of advanced television systems in broadcasting. (See Order, Advanced Television Systems and Their Impact on Existing Television Broadcasting Service, 52 Fed. Reg. 28346, July 29, 1987). However, Channel 32 is allotted to Weaverville in compliance with the terms of the freeze Order at a restricted site. Interested parties should note that any application submitted for Channel 32 at Weaverville which does not specify a site beyond the "freeze zone" governing the allotment will not be accepted for filing.

List of Subjects in 47 CFR Part 73

Television broadcasting.

Part 73 of title 47 of the Code of Federal Regulations is amended as follows:

PART 73—[AMENDED]

1. The authority citation for part 73 continues to read as follows:

Authority: Secs. 303, 48 Stat., as amended, 1082; 47 U.S.C. 154, as amended.

§73.606 [Amended]

2. Section 73.606(b), the Table of TV Allotments under California, is amended by adding Weaverville, Channel 32.

Federal Communications Commission. **John A. Karousos**,

Chief, Allocations Branch, Policy and Rules Division, Mass Media Bureau.

[FR Doc. 95–21907 Filed 9–1–95; 8:45 am] BILLING CODE 6712–01–F

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

[Docket No. 94-37; Notice 2]

RIN 2127-AF 22

Federal Motor Vehicle Safety Standards; Lamps, Reflective Devices and Associated Equipment

AGENCY: National Highway Traffic Safety Administration (NHTSA), DOT. **ACTION:** Final rule.

SUMMARY: This notice adopts amendments to the Federal Motor

Vehicle Safety Standard on lighting to replace the currently incorporated SAE J576c with the more recent SAE J576 JUL91 as the referenced standard on plastics materials, to replace ASTM D 1003–61 with the more recent ASTM D 1003–92 in the test procedures, and to allow alternative processing techniques, sample sizes and thickness tolerances to those presently specified. These amendments represent the choice of Option 1 from the notice of proposed rulemaking published in November 1994.

DATES: The effective date of the final rule is March 1, 1996.

FOR FURTHER INFORMATION CONTACT: Kenneth O. Hardie, Office of Rulemaking, NHTSA (202-366-6987). SUPPLEMENTARY INFORMATION: Heraeus DSET Laboratories, Inc. ("DSET"), of Phoenix, Arizona, petitioned NHTSA for rulemaking to amend Federal Motor Vehicle Safety Standard No. 108, Lamps, Reflective Devices, and Associated Equipment. Specifically, DSET asked that paragraph S5.1.2 be amended "to update the test specimen processing requirements of plastic material used for optical parts such as lenses and reflectors." Currently, these materials are required to conform to Society of Automotive Engineers (SAE) Recommended Practice J576c, May 1970. DSET wants NHTSA

to allow alternative processing techniques besides injection molding to produce test specimens, to allow test specimen sizes other than a 3 inch diameter disc and to change the specimen thickness tolerances from ± 0.005 inch to $\pm .010$ inch.

Those requirements for injection molding and for the diameter and thickness of the test specimen are set forth in J576c, May 1970.

NHTSA granted the petition and published a notice of proposed rulemaking in response to it on November 2, 1994 (59 FR 54881). The notice proposed two alternative amendments of S5.1.2 as a means of implementing its grant of DSET's petition. The agency asked commenters for their views on each of the alternatives.

Option 1. This option would substitute SAE J576 JUL91 for SAE J576c, May 1970, and make conforming amendments in the text of S5.1.2. Option 1 would also replace American Society for Testing and Materials (ASTM) D 1003–61 with ASTM D 1003–92 with respect to measurement of haze (which, as currently specified, would not exceed 7 percent). A specimen thickness tolerance of ± 0.25 mm (0.010 in.) would also be allowed as there is no technical reason to limit the test

specimen thickness tolerance to ± 0.005 in., and the value proposed by NHTSA as recommended by DSET appears to be a more reasonable tolerance for test specimens.

Option 2. This option would retain the current SAE and ASTM specifications but would allow processing techniques other than injection molding to produce equivalent test specimens, test specimens other than a disc of 3-inch diameter, and a test specimen thickness tolerance of ± 0.010 inch

Seven comments were received, five of which supported Option 1. These were from Flxible Corporation ("Flxible"), Transportation Safety Equipment Institute ("TSEI"), Robert Bosch, GmbH ("Bosch"), American Automobile Manufacturers Association ("AAMA"), and Ford Motor Company ("Ford"). Miles, Inc. opposed Option 1 and supported Option 2. The Plastics Division of General Electric Corporation ("GE") did not express a preference for either alternative.

Each of the commenters supporting Option 1 had a different concern. Flxible suggested that NHTSA adopt the base number of each SAE and ASTM standard/recommended practice, with the suffix notation "Latest Revision." In the company's view, this would eliminate the need to revise older materials and ensure that the safety standards reflect contemporary industry practice.

While this is an attractive notion, there are legal constraints against it. The SAE and ASTM materials per se are only guidelines and advisory in nature. Once they are incorporated into the Federal motor vehicle safety standards, they become "the law of the land", and a manufacturer must comply with them or face civil sanctions. Under the Administrative Procedure Act, a regulation imposing a substantive burden cannot be adopted in the absence of adequate public notice and an opportunity to comment. Under the approach suggested by Flxible, automatic updating of the safety standards to incorporate the latest SAE and ASTM revisions would occur with no prior public notice or opportunity to comment, and hence violate the Administrative Procedure Act. Further, NHTSA has found that many updated and revised materials change the previous materials in substantive ways. Some changes may not be in the interests of safety; the elimination of the heat test from SAE J576 JUL91 is one example of this. Other changes may increase, rather than reduce, a substantive burden upon industry. Regulated persons and the public must

be apprised of these changes before they are adopted.

NHTSA may, however, adopt an updated version without prior notice where there appears to be no substantive change since such an adoption is in the nature of a technical amendment. The agency is adopting an updated version in this final rule on the basis of a comment from TSEI. Under proposed paragraph S5.1.2(e), after exposure to the heat test, the samples shall conform to the color requirements of SAE J578a October 1966. TSEI pointed out that current paragraph S5.1.5 references SAE J578c February 1977. It recommended that NHTSA change both references to the specification of J578 MAY88.

NHTSA has compared the 1988 and 1977 versions of J578 with that of 1966. It finds no substantive difference between the 1966 and 1977 versions. The 1988 version, however, contains a third method of color measurement to be used "as a referee approach when the commonly used methods produce questionable results." In addition, the Appendix in the latter has added a section of "Color Measurements of Gaseous Discharge Lighting Devices." NHTSA ought to have comment on these changes before adopting SAE J578 MAY88, and, for this reason, has not followed TSEI's suggestion. On the other hand, because of the lack of substantive change between the other two versions, paragraph S5.1.2(e) is added with an update of the J578 reference to 1977 from the 1966 version which was proposed.

The wording of present paragraph S5.2.1 concerned Ford and AAMA Under this paragraph, phrases such as "It is recommended that" and "should be," which appear in materials incorporated by reference, are to be read as setting forth mandatory requirements. Ford and AAMA commented that these phrases should not be interpreted as applying to SAE J576 JUL91. In NHTSA's view, the result of adopting Ford's and AAMA's comments would be to make compliance of plastic materials used for optical parts a voluntary affair. This would defeat the purpose of the rulemaking.

Proposed paragraph S5.1.2(e) would require test samples, after the heat test, to "show no discernable change in shape and general appearance when compared with an unexposed specimen." This language comes from J576 itself, with the exception that the SAE uses "significant" rather than "discernable." Ford and AAMA objected to this substitution, arguing that it would establish a higher standard to be met by plastics, and that there is

no need to change language that has been a requirement for years. They recommended use of the word "significant." In their view, a change that is "discernable" is not necessarily one that is "significant."

In its proposal, NHTSA had no intention of increasing the burden on any regulated party. The agency proposed the word "discernable" with care, because it is objective, while "significant" is not. Motor vehicle safety standards are required by law to be "objective", 49 Û.S.C. 30111(a). The agency has concluded that "discernable" is more appropriate for a requirement specifically expressed in the text of Standard No. 108 (as compared with one incorporated by reference). However, NHTSA wishes to make clear that it views the words as essentially synonymous in this context. If a post-test change in shape or general appearance is discernable, NHTSA considers that to be significant. Such a change indicates the potential for degradation of a lens in use, with a corresponding effect upon color and photometrics of the lamp on which it is installed. To add even greater objectivity, the final rule expresses the requirement as "discernable to the naked eye." Should a change be discernable to the naked eye after testing, and a manufacturer believe that such a change is not "significant," the manufacturer may file a Part 573 Noncompliance Notification Report simultaneously with an application to NHTSA for a determination that the change resulting from that testing is inconsequential to motor vehicle safety.

GE did not choose between the alternatives in its comment. It did, however, recommend the adoption of SAE J576 JUL91 in its entirety, and that NHTSA not carry over the heat test from the previous version of J576. In its view, the heat tests of SAE J575 are adequate until further work is done on thermal issues suitable for incorporation into

Having considered the comments in response to the NPRM, NHTSA is amending Standard No. 108 to add the two new paragraphs proposed, maintaining the performance requirements required of plastic materials by SAE J576c for the heat test and specifying positioning of test samples during the test. These have been omitted by the SAE from J576 JUL91. NHTSA has chosen to retain the existing heat test as one that is familiar to industry and one which meets the need for motor vehicle safety. It is a minimum requirement, intended to establish a margin of safety between the temperatures at which plastic reflectors

and lenses may fail from internal heat, and temperatures on the exterior surface induced by exposure to sunlight. Lamp manufacturers use J575 or similar tests to determine whether the particular design characteristics of their lamps require use of premium materials in the lenses. It is a test of the finished lens as installed on the lamp, rather than a test of the materials used in finished products. Use of material with insufficient high temperature performance can result in reflectors that lose color and reflectivity.

The positioning of test samples will allow the sample to droop if its strength is adversely affected by the test.

In order to retain the current 3-year outdoor exposure time test requirements for plastic lenses used or covered by another material and not exposed directly to sunlight, NHTSA is adding a new paragraph S5.1.2(g) to specify that paragraph 3.3.3.1 of SAE J576 JUL91 does not apply as regards protected materials. For the same reason, NHTSA is not adopting paragraph 3.3.3.2. of SAE J576 JUL91 which allows an accelerated 6-month outdoor exposure test time. New paragraph S5.1.2(g) will not change the stringency or flexibility of the standard as it exists, but will ensure that the integrity of plastic materials is maintained by not permitting a lesser exposure time for materials which may be protected when in use.

Miles, Inc., a manufacturer of polycarbonate resin used as a material in lenses and reflectors, objected to Option 1. In its view, this alternative places an additional testing burden on the resin manufacturer, as compared with the present requirements. For this reason, it supported Option 2. Specifically, Miles opposes SAE J576 JUL91 because of Section 3.1 Materials to be Tested. This section reads:

Outdoor exposure tests shall be made on each material * * * offered for use in optical parts * * *. Concentrations of polymer components and additives such as plasticizer, lubricants, colorants, weathering stabilizers, and antioxidants in plastic materials and/or coatings may be changed without outdoor exposure testing if: the changes are within the limits of composition represented by higher and lower concentrations of these polymer components and additives have been tested in accordance with 3.3 and found to meet the requirements of Section 4.

Miles interprets this language to mean that changes in dye concentrations would only be permissible if samples containing lower and higher concentrations of dye had been exposure tested. Miles believes that this, in effect, would double the samples to

be tested when compared with the present requirements.

The present requirements are those of section 3.1 of SAE J576c, May 1970. These state, in pertinent part, that "[a] test of one color and formulation shall cover variations in dye concentration, but shall not cover changes in dye materials or changes in polymers. Miles interprets this as meaning that a new exposure test need not be conducted under the 1970 version if the only change in the product is a variation in dye concentration. Its present practice is to test for exposure materials incorporating new dyes only at the expected concentration level of the dye. One exposure test covers each new dye, but Miles will accept the test results as valid when there are small variations in dye concentration.

Miles is correct that SAE J576c allows a single test to cover variations in dye concentration. SAE J576 JUL91 may be interpreted as calling for the testing of two samples by specifying that dye concentrations in material to be used in motor vehicle optical parts must fall within the upper and lower limits of dye concentrations tested if there are variations in dye concentration. Miles believes the newer requirement will double its testing burden.

NHTSA does not agree that this is the inevitable result of the adoption of this portion of SAE J576 JUL 91. What paragraph S5.1.2 is intended to ensure is that lenses and reflectors, as manufactured for use on motor vehicles, are fabricated from plastic materials that meet SAE J576. The key issue is whether the equipment satisfies the performance requirements of the standard, not the number of tests conducted on the materials used in the equipment. Ultimately, the manufacturer of the vehicle in certifying compliance with all applicable Federal motor vehicle safety standards, is certifying that the lenses and reflectors on the vehicle are made from plastics materials that meet J576. If the lens or reflector is manufactured as replacement equipment, the certification responsibility is that of the manufacturer of the equipment. Thus, it is incumbent upon the vehicle or equipment manufacturer to assure itself that the materials it obtains from the plastics manufacturer comply with SAE J576 (and, furthermore, not to change the composition of the plastics materials so obtained in a manner that would cause it to be noncomplying). The documentation needed for such assurance, including the quantum of testing performed by the plastics manufacturer and by the vehicle or equipment manufacturer, is a decision

that each equipment or vehicle manufacturer must make under the particular circumstances. NHTSA, of course, expects manufacturers to exercise reasonable care in certifying their products, and, in the event of a noncompliance, the manufacturer may claim that it had no reason to know, despite exercising reasonable care, that the vehicle or equipment failed to comply. However, the allocation of that responsibility is a matter of contract between the manufacturer with the Federal certification responsibility and its plastic materials supplier. Plastic materials are not completed items of motor vehicle equipment subject to Standard No. 108 so the Federal certification responsibility does not fall upon Miles. If Miles or other materials manufacturers are satisfied, based on their extensive experience with dyes. that changes in dye concentration would not cause the plastic material to fail the specified performance requirements, they may be able to persuade their purchasers that additional testing is not needed.

Effective Date

The effective date of the final rule is March 1, 1996.

Rulemaking Analyses and Notices

Executive Order 12866 and DOT Regulatory Policies and Procedures. This final rule was not reviewed under Executive Order 12866. It has been determined that the rulemaking action is not significant under Department of Transportation regulatory policies and procedures. The purpose of the rulemaking action is to update testing procedures. Since the final rule will have no significant cost or other impacts, preparation of a full regulatory evaluation is not warranted.

National Environmental Policy Act. NHTSA has analyzed this rulemaking action for the purposes of the National Environmental Policy Act. The final rule will not have a significant effect upon the environment. The composition of plastic materials used in optical parts will not change from those presently in production.

Regulatory Flexibility Act. The agency has also considered the impacts of this rulemaking action in relation to the Regulatory Flexibility Act. I certify that this rulemaking action does not have a significant economic impact upon a substantial number of small entities. Accordingly, no regulatory flexibility analysis has been prepared. Manufacturers of motor vehicles and motor vehicle equipment, those affected by the rulemaking action, are generally not small businesses within the

meaning of the Regulatory Flexibility Act. Further, small organizations and governmental jurisdictions will not be significantly affected because the price of new vehicles and vehicle equipment will not be impacted.

Executive Order 12612 (Federalism). This rulemaking action has also been analyzed in accordance with the principles and criteria contained in Executive Order 12612, and NHTSA has determined that this rulemaking action does not have sufficient Federalism implications to warrant the preparation of a federalism Assessment.

Civil Justice. The final rule will not have any retroactive effect. Under 49 U.S.C. 30103, whenever a Federal motor vehicle safety standard is in effect, a state may not adopt or maintain a safety standard applicable to the same aspect of performance which is not identical to the Federal standard. 49 U.S.C. 30161 sets forth a procedure for judicial review of final rules establishing, amending or revoking Federal motor vehicle safety standards. That section does not require submission of a petition for reconsideration or other administrative proceedings before parties may file suit in court.

List of Subjects in 49 CFR Part 571

Imports, Motor vehicle safety, Motor vehicles

PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

In consideration of the foregoing, 49 CFR part 571 is amended as follows:

1. The authority citation for part 571 continues to read as follows:

Authority: 49 U.S.C. 322, 30111, 30115, 30117 and 30166; delegation of authority at 49 CFR 1.50.

2. Section 571.108 is amended by revising paragraph S5.1.2, to read as follows:

§ 571.108 Motor Vehicle Safety Standard No. 108; Lamps, reflective devices, and associated equipment.

* * * * * *

S5.1.2 Plastic materials used for optical parts such as lenses and reflectors shall conform to SAE Recommended Practice J576 JUL91, except that:

- (a) Plastic lenses (other than those incorporating reflex reflectors) used for inner lenses or those covered by another material and not exposed directly to sunlight shall meet the requirements of paragraphs 3.3 and 4.2 of SAE J576 JULY91 when covered by the outer lens or other material;
- (b) After the outdoor exposure test, the haze and loss of surface luster of

plastic materials (other than those incorporating reflex reflectors) used for outer lenses shall not be greater than 30 percent haze as measured by ASTM D 1003-92, Haze and Luminous Transmittance of Transparent Plastic;

- (c) After the outdoor exposure test, plastic materials used for reflex reflectors and for lenses used in front of reflex reflectors shall not show surface deterioration, crazing, dimensional changes, color bleeding, delamination, loss of surface luster, or haze that exceeds 7 percent as measured under ASTM D 1003-92.
- (d) The thickness of the test specimens specified in paragraph 3.2.2 of SAE J576 JUL91 may vary by as much as ±0.25 mm.
- (e) After exposure to the heat test as specified in subparagraph (f) of this paragraph, and after cooling to room ambient temperature, a test specimen shall show no change in shape and general appearance discernable to the naked eye when compared with an unexposed specimen. The trichromatic coefficients of the samples shall conform to the requirements of SAE J578c, "Color Specification for Electric Signal Lighting Devices", February 1977.
- (f) Two samples of each thickness of each plastic material are used in the heat test. Each sample is supported at the bottom, with at least 51 mm. of the sample above the support, in the vertical position in such a manner that, on each side, the minimum uninterrupted area of exposed surface is not less than 3225 sq. mm. The samples are placed for two hours in a circulating air oven at 79 ± 3 degrees C.
- (g) All outdoor exposure tests shall be 3 years in duration, whether the material is exposed or protected. Accelerated weathering procedures are not permitted.

Issued on August 29, 1995.

Ricardo Martinez,

Administrator.

[FR Doc. 95-21865 Filed 9-1-95; 8:45 am] BILLING CODE 4910-59-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 672

[Docket No. 950206041-5041-01; I.D. 082895A1

Groundfish of the Gulf of Alaska: Pacific Cod with Jig and Pot Gear for **Processing by the Inshore Component** in the Central Regulatory Area

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Modification of a closure.

SUMMARY: NMFS is opening directed fishing for Pacific cod by vessels catching Pacific cod with jig and pot gear for processing by the inshore component in the Central Regulatory Area of the Gulf of Alaska (GOA). This action is necessary to use the total allowable catch (TAC) for Pacific cod in this area.

EFFECTIVE DATE: 12 noon, Alaska local time (A.l.t.), September 1, 1995, until 12 midnight, A.l.t., December 31, 1995. FOR FURTHER INFORMATION CONTACT: Andrew N. Smoker, 907-586-7228. SUPPLEMENTARY INFORMATION: The groundfish fishery in the GOA exclusive economic zone is managed by NMFS according to the Fishery Management Plan for Groundfish of the Gulf of Alaska (FMP) prepared by the North Pacific Fishery Management Council under authority of the Magnuson Fishery Conservation and Management Act. Fishing by U.S. vessels is governed

by regulations implementing the FMP at

50 CFR parts 620 and 672.

In accordance with $\S672.20(c)(1)(ii)(B)$, the allocation of Pacific cod for the inshore component in the Central Regulatory Area of the GOA was established by the Final 1995 Harvest Specifications of Groundfish (60 FR 8470, February 14, 1995) as 41,085 metric tons (mt). The directed fishery for Pacific cod by vessels catching Pacific cod for processing by the inshore component in the Central Regulatory Area of the GOA was closed under § 672.20(c)(2)(ii) on March 22, 1995, in order to reserve amounts anticipated to be needed for incidental catch in other fisheries (60 FR 15521, March 24, 1995). NMFS has determined that as of August 8, 1995, 4,313 mt remain unharvested.

The Director, Alaska Region, NMFS, has determined that the 1995 TAC for Pacific cod for processing by the inshore component in the Central Regulatory Area of the GOA has not been reached.

Therefore, NMFS is terminating the previous closure and is opening directed fishing for Pacific cod by vessels catching Pacific cod for processing by the inshore component in the Central Regulatory Area of the GOA. All other closures remain in full force and effect.

This action opens the directed fishery for Pacific cod by vessels catching Pacific cod with jig and pot gear for processing by the inshore component in the Central Regulatory Area of the GOA. Directed fishing for groundfish with hook-and-line and trawl gear is currently prohibited (60 FR 26694, May 18, 1995; 60 FR 37600, July 21, 1995; 60 FR 37601, July 21, 1995).

Classification

This action is taken under 50 CFR 672.20 and is exempt from review under E.O. 12866.

Authority: 16 U.S.C. 1801 et seq.

Dated: August 29, 1995.

Richard H. Schaefer,

Director, Office of Fisheries Conservation and Management, National Marine Fisheries Service.

[FR Doc. 95-21948 Filed 8-30-95; 3:43 pm] BILLING CODE 3510-22-F

50 CFR Part 672

[Docket No. 950206041-5041-01; I.D. 082995A]

Groundfish of the Gulf of Alaska; **Trawling in the Western Regulatory**

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Inseason adjustment; request for comments.

SUMMARY: NMFS issues an inseason adjustment closing the season for all groundfish by vessels using trawl gear, except fishing for pollock by vessels using pelagic trawl gear, in the Western Regulatory Area of the Gulf of Alaska (GOA). This action is necessary to prevent overfishing of Pacific ocean perch (POP).

DATES: Effective 12 noon. Alaska local time (A.l.t.), September 1, 1995, until 12 midnight, A.l.t., December 31, 1995. Comments must be received no later than 4:30 p.m., A.l.t., September 18,

ADDRESSES: Comments may be sent to Ronald J. Berg, Chief, Fisheries Management Division, Alaska Region, NMFS, P.O. Box 21668, Juneau, AK 99802, Attn. Lori Gravel, or be delivered Mr. Shigeyoshi Aihara Project Manager Regulation and Compliance Engineering Administration Department Ichikoh Industries, Ltd. 80 Itado Ishehara City Kanagawa Pref. 250-1192 Japan

Dear Mr. Aihara:

This is in reply to your letter of June 10, 1999, presented at a meeting with NHTSA representatives that day, asking for an interpretation of S5.1.2 of Federal Motor Vehicle Safety Standard No. 108. I am sorry that we were unable to provide you a response by July 6 as you requested in your letter of June 28 to Taylor Vinson of this Office.

Your company has developed a new rear turn signal lamp, consisting of an outer plastic lens, an inner cap, and an uncolored filament bulb. The color of the lens is "pale (light) pink color, and, this plastic material complies with the requirements of SAE J576c . . . excluding the color requirement." You tell us that the trichromaticity coordinates of the plastic material used in the outer lens do not fall within either the red or the white areas of the chromaticity chart of SAE J578c. However, when illuminated, the lamp provides an amber color that fall within the coordinates specified in SAE J578c. You have asked whether this design is acceptable under S5.1.2 relating to plastic materials used in optical parts of motor vehicle lighting devices.

Although this does not affect our answer to your question, please note, in Standard No. 108, that SAE Recommended Practice J576c of 1970 has been replaced by SAE J576 JUL91 as the applicable standard for plastic materials used in lighting devices. However, J578c remains the Federal standard for color.

We regret to inform you that this design is not acceptable. Although S1, *Scope*, of SAE J578c states that "The specification applies to the overall effective color of light emitted by the device," regardless of the color of its lens, both SAE J576 JUL91 and Standard No. 108 apply the color requirement to plastic components of lamps as well. S5.1.2(e) of Standard No. 108 requires the trichromatic coordinates of the plastic samples, tested according to that paragraph, to conform to the requirements of SAE J578c. Paragraphs 4.1 and 4.2.2 of SAE J576 JUL91 also require conformance of plastic samples to the chromaticity coordinate requirements of SAE J578c. This standard specifies color coordinates only for red, white, yellow (amber), green, and blue. Because the lens of your lamp does not meet any of the coordinates of SAE J578c, Standard No. 108 does not permit its use.

At the meeting, we noted that the iner lens was a greenish color. It, too, must comply with the color coordinate requirements of paragraphs 4.1 and 4.2.2 of SAE J576 JUL91.

At that time, you also asked if it were acceptable to use a plastic fabricated from the mix of two resins, each of which complied with the requirements of SAE J576. You cannot assume, when two complying resins are blended, that the resulting plastic will also comply with SAE J576 JUL91, and we recommend that you test the blended plastic to ensure that it meets all the specifications of S5.1.2 and SAE J576 JUL91. This would be the case whether it was the intent to create a new color, or whether the rejected molded parts are reground and plastics of differing compositions are mixed and recycled into newly-molded lamp lenses. As we said in the preamble to the 1995 final rule amending S5.1.2, "it is incumbent upon the vehicle or equipment manufacturer . . . not to change the composition of the plastics materials [obtained from the plastics manufacturer] in a manner that would cause it to be noncomplying." 60 FR 46066, copy enclosed.

Sincerely, Frank Seales, Jr. Chief Counsel Enclosure ref:108 d.8/27/99

1 of 1 4/20/2007 3:36 PM

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Administration

MAR 2 7 2009

1200 New Jersey Avenue SE. Washington, DC 20590

Mr. Kiminori Hyodo Deputy General Manager, Regulation & Certification Koito Manufacturing Co., Ltd. 4-8-3, Takanawa Minato-Ku Tokyo Japan DEFI OF ISSUED RAIDING

Dear Mr. Hyodo:

This responds to your letter, in which you ask about test requirements for plastic materials for use in lenses under Federal Motor Vehicle Safety Standard (FMVSS) No. 108, <u>Lamps</u>, <u>Reflective Devices</u>, and <u>Associated Equipment</u>. Specifically, you asked whether you could exclude the presence of metal particles contained within a plastic lens from the outdoor exposure test incorporated by reference into Standard No. 108. You also asked what the term "lens" means under S5.1.2 of FMVSS No. 108. Our responses are presented below.

By way of background, the National Highway Traffic Safety Administration (NHTSA) is authorized to issue FMVSSs that set performance requirements for new motor vehicles and items of motor vehicle equipment (see 49 U.S.C. Chapter 301). NHTSA does not provide approvals of motor vehicles or motor vehicle equipment. Instead, manufacturers are required to self-certify that their products conform to all applicable safety standards that are in effect on the date of manufacture. NHTSA selects a sampling of new vehicles and regulated equipment each year to determine their compliance with applicable FMVSSs. If our testing or examination reveals an apparent noncompliance, we may require the manufacturer to remedy the noncompliance, and may initiate an enforcement proceeding if necessary to ensure that the manufacturer takes appropriate action.

Do the metal particles need to be included in the "haze test?"

Your first question relates to the presence of a layer of metal particles on the lens. According to your letter, a process called "half-metalization" allows you to create a semitransparent metallic layer on your lens, between the lens and a protective coating. This half-metalized layer effectively reduces light transmission to about 30% of a non-metalized lens.



As you state in your letter, FMVSS No. 108 requires that optical parts be certified to comply with the testing procedures in SAE Recommended Practice J576 (JUL 91), "Plastic Materials for use in Optical Parts such as Lenses and Reflex Reflectors of Motor Vehicle Lighting Devices," incorporated by reference into paragraph S5.1.2 of the standard. Part of this practice specifies that materials be subject to a three year outdoor exposure test. Your specific question asked if you could exclude the presence of the metal particles from the three year exposure test. In asking this question, you state that metals are inorganic and do not excite plastics and also, since half-metalization is applied on the inner surface and protected by the coating, it would not be oxidized.

In responding to your question as to whether you can exclude the metal particles from the test, we note that each of this agency's safety standards specifies the test conditions and procedures that this agency will use to evaluate the performance of the vehicle or equipment being tested for compliance with the particular safety standard. NHTSA follows these specified test procedures and conditions when conducting its compliance testing.

Manufacturers are not required to test their products in the manner specified in the relevant safety standard, or even to test the product at all, as their basis for certifying that the product complies with all relevant standards. A manufacturer may choose any valid means of evaluating its products to determine whether the vehicle or equipment will comply with the safety standards when tested by the agency according to the procedures specified in the standard and to provide a basis for its certification of compliance.

If we tested this product, the outdoor exposure test would include the presence of the metal particles. There is nothing in FMVSS No. 108, including the relevant items incorporated by reference, that specifies excluding the particles. We also note that much like protective coatings, these particles have a substantial effect on the transparency and endurance of the lens, and we therefore believe they should be included as part of the lens in all relevant test requirements.

Definition of the term "lens"

Your second question concerned the definition of the term "lens" under S5.1.2 of FMVSS No. 108, and whether that definition would include a half-metalized area surrounding the effective projected luminous lens area. You stated that the non-metalized portion of the lens would meet all photometric requirements of the standard, and that it would be surrounded by a half-metalized portion of the lens, which would emit only a small amount of light for decorative purposes.

The term "lens," while not explicitly defined in Standard No. 108, is commonly understood within automotive lighting lamp applications as a component of a lamp that as installed allows light to pass through it. For the purposes of S5.1.2, all plastic portions of this component that allow light to pass through it are part of the "lens," subject to the haze test, including the half-metalized area that you state would emit a small amount of light.

Are the non-EPLLA portions of the lens subject to the S5.1.2 requirements?

You followed up your second question by asking, "when half-metalization is applied only to the part surrounding the effective projected luminous lens area, would it be excluded from [the] S5.1.2 requirement?" Our answer is no.

It is our opinion that all portions of the lens, including the half-metalized areas that only emit small amounts of light for decorative purposes, are subject to the requirements of S5.1.2, which specify haze and weathering requirements similar to those described in SAE Recommended Practice J576.

The language of S5.1.2 reads, "Plastic materials used for optical parts such as lenses and reflectors shall conform to [SAE J576]...." When testing plastic materials, however, the agency does not simply test a plastic plaque alone. Instead, the plastic plaque is tested with its coating, which frequently is necessary to protect the plastic from the effects of weathering. The coating on the plastic is an integral feature in protecting the plastic from moisture, ultraviolet light, and other agents.

You described your lens as having a semitransparent metallic layer between the lens and the coating. In addition to the effect this has on the transparency of that portion of the lens, it may also affect the weathering aspects. For example, if the metal layer affected the bonding of the coating to the plastic, it could have substantial affect on whether the lens could tolerate weathering.

Because, as described above, the lens is a single piece, if even a decorative, half-metalized portion of the lens were to fail the weathering requirements in S5.1.2, it could have a substantial affect on the entire lens. For example, moisture could enter the lens, affecting the non-metalized portion's transparency.

For these reasons, when testing the lens you described, the half-metalized portion of the lamp design described in your letter would be included as an item subject to the testing requirements of S5.1.2 of FMVSS No. 108.

If you have any further questions, please contact Ari Scott of my staff at (202) 366-2992.

Sincerely yours,

Stephen P. Wood Acting Chief Counsel

Soul . Por



500, KITAWAKI SHIMIZU-SHI, SHIZUOKA-KEN **JAPAN** TEL NO. 0543-45-2573 FAX NO. 0543-45-3437

KOITO MANUFACTURING CO., LTD.

CONTRACTORS

DIRIO ABU

HEAD OFFICE 4-8-3, TAKANAWA MINATO-KU TOKYO TEL NO. 03-3443-7111 FAX NO. 03-3447-1520

12 October, 2007

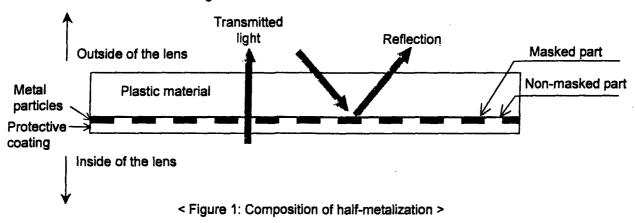
U.S. Dept. of Transportation **NHTSA** Office of the Chief Counsel 400 seventh Street SW Washington DC 20590

Request for Interpretation Dear Mr. Anthony M. Cooke.

Koito would like to thank you in advance for your consideration of our request for an interpretation and clarification of the Federal Motor Vehicle Safety Standard (FMVSS) No.108 concerning the necessity of carrying out a 3-year outdoor exposure test in a certain combination of plastic and protective coating material with metal particles in between.

Description:

We are contemplating a new technique called "half-metalization (evapolization)", which is to be applied on the inner surface of a plastic lens of automotive lamps. "Half-metalization" is an expanded application of metal evaporation which is widely used for the surface treatment of lamp reflectors. In this new technique, careful conditioning of the metal density enables us to make a specular appearance of the lens surface, where the light transmission would be lowered to e.g. 30% of a non-metalized lens.



As you see in the figure above, in a microscopic view, the metal particles placed between the plastic and protective coating create partial maskings on the lens, whereas the light passes from the non-masked part only. However, when used in a lamp, this reduced transmission will be balanced out by other designing factors so that the lamp satisfies all the FMVSS108 requirements (e.g. photometric, color) applicable to it.

Question No.1: Can we exclude the presence of metal particles from the target of SAE J576 3-year outdoor exposure test?

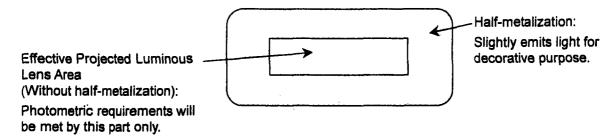
FMSSS 108 requires that plastic materials used for optical parts must be in compliance with SAE J576 JUL91 (S5.1.2.) including the 3-year outdoor exposure test. We basically understand that the target of 3-year outdoor exposure test (i.e. measurement of luminous transmittance, haze, and compliance with SAE J578 chromaticity and appearance requirement as required under S4.2 of SAE J576 JUL91) is a combination of plastic and coating, whereas if they comply with the 3-year outdoor exposure requirement, the metal particles on the lens (where the light does not pass) can be excluded from the test. In this case, however, the lamp using half-metalized lens must be designed to satisfy all the applicable requirements (e.g., photometric and color) required by FMVSS108.

Supporting this discussion, we can say that metals are inorganic and do not excite plastics. Also, since half-metalization is applied on the inner surface and protected by the coating, it would not be oxidized.

Question No.2; What the term "lens" means under S5.1.2. of FMVSS108?

S5.1.2. of FMVSS108 requires that plastic materials used for optical parts such as <u>lenses</u> and reflectors shall conform to SAE J576 JUL91. Does the term "lens" under S5.1.2. indicate the effective part of the lens (corresponding to the effective projected luminous lens area) only, or whole part of the lens?

In conjunction with above question, when half-metalization is applied only to the part surrounding the effective projected luminous lens area, would it be excluded from S5.1.2. requirement? (In this case, of course, photometric requirements will be met by the effective projected luminous lens area only, and the half-metalized part slightly emits light for decorative purpose.)



< Figure 2: Half-metalization outside EPLLA >

Koito Manufacturing thanks you in advance for your early confirmation on this matter.

Sincerely,

Kiminori Hvodo

Deputy General Manager, Regulation & Homologation

Koito Manufacturing Co., Ltd.

were amended in 2005. Reinstating the specific language in the regulations will therefore not increase the paperwork burden on those manufacturers.

H. Executive Order 13045

Executive Order 13045 applies to any rule that (1) is determined to be "economically significant" as defined under E.O. 12866, and (2) concerns an environmental, health, or safety risk that NHTSA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, we must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned rule is preferable to other potentially effective and reasonably feasible alternatives considered by us. This rulemaking is not economically significant and does not concern an environmental, health, or safety risk.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104-113, section 12(d) (15 U.S.C. 272) directs NHTSA to use voluntary consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies, such as the Society of Automotive Engineers (SAE). The NTTAA directs the agency to provide Congress, through the OMB, with explanations when we decide not to use available and applicable voluntary consensus standards.

In this final rule, we are adding to 49 CFR 576.4(g)(5) the requirement that manufacturers include in the certification labels that they affix to certain types of motor vehicles a statement certifying that the vehicle conforms to all applicable FMVSS. This language was inadvertently omitted from the regulation in 2005 and we are adopting no substantive changes to the regulation nor do we propose any technical standards. For these reasons, Section 12(d) of the NTTAA would not apply.

J. Regulation Identifier Number (RIN)

The Department of Transportation assigns a regulation identifier number (RIN) to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified

Agenda in April and October of each year. You may use the RIN contained in the heading at the beginning of this document to find this action in the Unified Agenda.

List of Subjects in 49 CFR Part 567

Labeling, Motor vehicle safety, Motor vehicles.

In consideration of the foregoing, Part 567, Certification, in Title 49 of the Code of Federal Regulations is amended as follows:

PART 567—CERTIFICATION

■ 1. The authority citation for part 567 is revised to read as follows:

Authority: 49 U.S.C. 322, 30111, 30115, 30117, 30166, 32502, 32504, 33101–33104, 33108, and 33109; delegation of authority at 49 CFR 1.95.

■ 2. Amend § 567.4 by adding paragraph (g)(5)(iv) to read as follows:

§ 567.4 Requirements for manufacturers of motor vehicles.

(g) * * * (5) * * *

(iv) For all other vehicles, the statement: "This vehicle conforms to all applicable Federal motor vehicle safety standards in effect on the date of manufacture shown above." The expression "U.S." or "U.S.A." may be inserted before the word "Federal".

Issued on: November 28, 2012.

Daniel C. Smith,

Senior Associate Administrator for Vehicle Safety.

[FR Doc. 2012–29132 Filed 12–3–12; 8:45 am] BILLING CODE 4910–59–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

[Docket No. NHTSA-2012-0171]

RIN 2127-AK99

Federal Motor Vehicle Safety Standards; Lamps, Reflective Devices, and Associated Equipment

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT). **ACTION:** Final rule.

SUMMARY: NHTSA is amending the Federal motor vehicle safety standard (FMVSS) on lamps, reflective devices, and associated equipment to restore the

blue and green color boundaries that were removed when the agency published a final rule reorganizing that standard on December 4, 2007.

DATES: Effective date: December 4, 2012. Petitions for reconsideration: Petitions for reconsideration of this final rule must be received not later than January 18, 2013.

ADDRESSES: Any petitions for reconsideration should refer to the docket number of this document and be submitted to: Administrator, National Highway Traffic Safety Administration, 1200 New Jersey Avenue SE, West Building, Ground Floor, Docket Room W12–140, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: For technical issues: Ms. Marisol Medri, Office of Crash Avoidance Standards, NHTSA, 1200 New Jersey Avenue SE, West Building, Washington, DC 20590 (Telephone: (202) 366–6987) (Fax: (202) 366–7002).

For legal issues: Mr. Thomas Healy, Office of the Chief Counsel, NHTSA, 1200 New Jersey Avenue SE, West Building, Washington, DC 20590 (Telephone: (202) 366–2992) (Fax: (202) 366–3820).

SUPPLEMENTARY INFORMATION:

I. Background

FMVSS No. 108, Lamps, Reflective Devices and Associated Equipment, has been in existence since 1968. The standard had been amended on an ad hoc basis over time resulting in a patchwork organization of the standard. NHTSA published a final rule on December 4, 2007, amending FMVSS No. 108 by reorganizing the regulatory text so that it provides a more straightforward and logical presentation of the applicable regulatory requirements; incorporating important agency interpretations of the existing requirements; and reducing reliance on third-party documents incorporated by reference. The preamble of the final rule stated that the rewrite of FMVSS No. 108 was administrative in nature and would have no impact on the substantive requirements of the standard. The December 4, 2007 final rule made several changes to the proposal contained in the Notice of Proposed Rulemaking for that rule including removing the blue and green color boundary requirements from paragraph S14.4.1.3.2 and eliminating references to three additional SAE documents.

¹72 FR 68234, (Dec. 4, 2007). The agency published the Notice of Proposed Rulemaking proposing to reorganize the standard on December 30, 2005. 70 FR 77454, (Dec. 30, 2005).

SABIC Innovative Plastics US LLC (SABIC-IP) sent a letter to NHTSA on August 11, 2008, after the final rule comment period was over. In this letter, SABIC-IP stated that the agency did not allow for public comment when it made the decision to remove the blue and green color boundaries from the standard. SABIC–IP further stated that in removing the blue and green color boundaries from paragraph S14.4.1.3.2, the agency substantively changed the requirements of FMVSS No. 108 during the rewrite process. On July 13, 2011, NHTSA published a NPRM² initiating this rulemaking to replace the color boundaries that were removed during the administrative rewrite of the standard.

In the NPRM, the agency explained that while neither blue nor green are directly permitted by the standard, it is possible to use these color boundaries to certify a material to the outdoor exposure test. Once individually certified to the three year outdoor exposure test, the blue and clear material could be mixed to produce a clear material with a blue tint, which could then be used in a lamp lens provided the lamp itself emits light within the white color boundary. Under the standard, the mixed material can be certified to the outdoor exposure test without an additional three years of testing. The pre-rewrite version of the standard contained two tests for determining compliance with the color requirements in the standard, the Visual Method or the Tristimulus Method. The blue and green color boundary definitions that were removed are part of the color requirements of the Tristimulus method procedure. The NPRM proposed to amend FMVSS No. 108 to restore the color boundary definitions for green, restricted blue and signal blue so that the requirements of the rewrite coincide with those of the old standard.

II. Public Comments on NPRM

NHTSA received four public comments in response to the Notice of Proposed Rulemaking for this rulemaking.³ All of the comments supported reinstating the color boundary definitions for green, restricted blue and signal blue to FMVSS No. 108.

The Alliance of Automobile Manufacturers (the "Alliance") supported the rulemaking but stated that the agency omitted the color

requirements for green and blue when tested according to the visual method. The Alliance claimed that these requirements from SAE J578c Color Specification for Electric Signal Lighting Devices, (FEB 1977) (the third party standard from which the color boundaries were derived) were incorporated into the NPRM proposing the reorganization of the standard but were not incorporated into the December 4, 2007 Final Rule. The Alliance recommended that these requirements be reinstated into the standard as sections 14.4.1.3.2.4 and 14.4.1.3.2.5.

SABIC-IP submitted a comment urging the agency to restore the green and blue color boundaries to FMVSS No. 108. SABIC-IP also requested that the agency clarify that polymers and additives would not have to be retested to the three year outdoor exposure test after the effective date of the administrative rewrite before being combined to create new materials. SABIC-IP stated that the rewrite of the standard creates ambiguity as to whether combinations of individually certified materials can continue to be mixed to create new material and then certified to the outdoor exposure test without an additional three years of testing as was permitted under the prewrite version of the standard. SABIC-IP requested that NHTSA amend paragraph S14.4.2.2.2 to state that materials and additives used in plastics could be changed without outdoor exposure testing if the materials had previously been tested to FMVSS No. 108 and found to meet the requirements. Paragraph S14.4.2.2.2 currently states that materials and additives used in plastics can be changed without outdoor exposure testing if the materials have previously been tested to "this section" and found to meet the requirements. SABIC-IP believes that it is possible to interpret the use of the words "this section" in paragraph S14.4.2.2.2 to require that materials be retested to the outdoor exposure test in the new paragraph \$14.4.2.2.2, published in December 2007, before they can be used to create new materials. SABIC-IP stated that this interpretation would go against the stated goal of the rewrite of the standard to refrain from making any substantive change to the requirements.

SABIC—IP also asked the agency to clarify that the lower concentration of additive of previously tested materials used to create a new material according to S14.4.2.2.2 paragraph can be represented by a composition of zero.

III. Agency Decision

Since it was not the agency's intention to create any substantive modifications to the standard, we have decided to amend FMVSS No. 108 to add the color boundary definitions for green, restricted blue and signal blue to the Tristimulus method procedure as proposed in the NPRM and to include the two missing color requirements from the visual method procedure so that the requirements of the rewrite coincide with those of the old standard.

We have decided not to amend paragraph S14.4.2.2.2 of FMVSS No. 108 as requested by SABIC-IP over the course of the rewrite rulemaking. We attempted, where ever possible, to avoid changes to the language of the standard. We note that the phrase "this section" refers to the requirements of paragraph S14.4.2.2 in general, not to a specific version of the standard. Thus, so long as the additives and polymers have previously been tested to and found to comply with the same substantive requirements as they appear in FMVSS No. 108, they can be added to create new materials without additional outdoor exposure testing. However, if the requirements of S14.4.2.2 were changed, previously tested additives and polymers would no longer have been tested to "this section" and would have to be retested to the outdoor exposure test before being used to create new materials under paragraph S14.4.2.2.2.

The agency will respond to SABIC—IP's comment about the lower concentration of additive used to create new materials being represented by a composition of zero in a letter of interpretation from the NHTSA Office of Chief Counsel.

IV. Effective Date

The National Highway and Motor Vehicle Safety Act states that an FMVSS issued by NHTSA cannot become effective before 180 days after the standard is issued unless the agency makes a good cause finding that a different effective date is in the public interest. Additionally, the Administrative Procedure Act (5 U.S.C. 553(d)) requires that a rule be published 30 days prior to its effective date unless one of three exceptions applies. One of these exceptions is when the agency finds good cause for a shorter period. We have determined that it is in the public interest for this final rule to have an immediate effective date so that the effective date of this final rule coincides as closely as possible with the effective date of the 2007 rewrite of the standard. An effective date for this final rule that

² 76 FR 41181, (July 13, 2011).

³ The Alliance of Automobile Manufacturers, SABIC–IP and two private individuals submitted comments in response to the NPRM.

closely coincides with the 2007 rewrite of the standard will ensure that the requirements of FMVSS No. 108 remain consistent so as to avoid unnecessary changes in the requirements of the standard that would force regulated parties to change their compliance strategies, potentially imposing costs on manufacturers while not improving safety.

V. Regulatory Notices and Analyses

A. Executive Order 12866, Executive Order 13563, and DOT Regulatory Policies and Procedures

NHTSA has considered the impact of this rulemaking action under Executive Order 12866, Executive Order 13563, and the DOT's regulatory policies and procedures. This final rule was not reviewed by the Office of Management and Budget (OMB) under E.O. 12866, "Regulatory Planning and Review." It is not considered to be significant under E.O. 12866 or the Department's regulatory policies and procedures.

This Final Rule restores existing requirements to the standard thereby maintaining flexibility in compliance for manufacturers who choose to use these colors to certify materials to the outdoor exposure test. Because this Final Rule merely restores existing requirements it is not expected to have any costs. The agency expects some minor unquantifiable benefits to manufacturers due to the continued availability of the green and blue color boundaries to certify to the outdoor exposure test. Because there are not any costs associated with this rulemaking and only minor unquantifiable benefits, we have not prepared a separate economic analysis for this rulemaking.

B. Executive Order 13609: Promoting International Regulatory Cooperation

The policy statement in section 1 of Executive Order 13609 provides, in part:

The regulatory approaches taken by foreign governments may differ from those taken by U.S. regulatory agencies to address similar issues. In some cases, the differences between the regulatory approaches of U.S. agencies and those of their foreign counterparts might not be necessary and might impair the ability of American businesses to export and compete internationally. In meeting shared challenges involving health, safety, labor, security, environmental, and other issues, international regulatory cooperation can identify approaches that are at least as protective as those that are or would be adopted in the absence of such cooperation. International regulatory cooperation can also reduce, eliminate, or prevent unnecessary differences in regulatory requirements.

NHTSA is not aware of any conflicting regulatory approach taken by a foreign

government concerning the subject matter of this rulemaking.

C. Regulatory Flexibility Act

In compliance with the Regulatory Flexibility Act, 5 U.S.C. 60l et seq., NHTSA has evaluated the effects of this action on small entities. I hereby certify that this rule would not have a significant impact on a substantial number of small entities. The final rule would affect manufacturers of motor vehicle light equipment, but the entities that qualify as small businesses would not be significantly affected by this rulemaking because the agency is restoring requirements that previously existed in an older version of the regulation. This rulemaking is not expected to affect the cost of manufacturing motor vehicle lighting equipment.

D. Executive Order 13132

NHTSA has examined today's rule pursuant to Executive Order 13132 (64 FR 43255, August 10, 1999) and concluded that no additional consultation with States, local governments or their representatives is mandated beyond the rulemaking process. The agency has concluded that the rulemaking would not have sufficient federalism implications to warrant consultation with State and local officials or the preparation of a federalism summary impact statement. The final rule would not have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

NHTSA rules can preempt in two ways. First, the National Traffic and Motor Vehicle Safety Act contains an express preemption provision: "When a motor vehicle safety standard is in effect under this chapter, a State or a political subdivision of a State may prescribe or continue in effect a standard applicable to the same aspect of performance of a motor vehicle or motor vehicle equipment only if the standard is identical to the standard prescribed under this chapter." 49 U.S.C. 30103(b)(1). It is this statutory command by Congress that preempts any nonidentical State legislative and administrative law addressing the same aspect of performance.

The express preemption provision set forth above is subject to a savings clause under which "[c]ompliance with a motor vehicle safety standard prescribed under this chapter does not exempt a person from liability at common law." 49 U.S.C. 30103(e) Pursuant to this

provision, State common law tort causes of action against motor vehicle manufacturers that might otherwise be preempted by the express preemption provision are generally preserved. However, the Supreme Court has recognized the possibility, in some instances, of implied preemption of such State common law tort causes of action by virtue of NHTSA's rules, even if not expressly preempted. This second way that NHTSA rules can preempt is dependent upon there being an actual conflict between an FMVSS and the higher standard that would effectively be imposed on motor vehicle manufacturers if someone obtained a State common law tort judgment against the manufacturer, notwithstanding the manufacturer's compliance with the NHTSA standard. Because most NHTSA standards established by an FMVSS are minimum standards, a State common law tort cause of action that seeks to impose a higher standard on motor vehicle manufacturers will generally not be preempted. However, if and when such a conflict does exist—for example, when the standard at issue is both a minimum and a maximum standard the State common law tort cause of action is impliedly preempted. See Geier v. American Honda Motor Co., 529 U.S. 861 (2000).

Pursuant to Executive Order 13132 and 12988, NHTSA has considered whether this rule could or should preempt State common law causes of action. The agency's ability to announce its conclusion regarding the preemptive effect of one of its rules reduces the likelihood that preemption will be an issue in any subsequent tort litigation.

To this end, the agency has examined the nature (e.g., the language and structure of the regulatory text) and objectives of today's rule and finds that this rule, like many NHTSA rules, prescribes only a minimum safety standard. As such, NHTSA does not intend that this rule preempt state tort law that would effectively impose a higher standard on motor vehicle manufacturers than that established by today's rule. Establishment of a higher standard by means of State tort law would not conflict with the minimum standard announced here. Without any conflict, there could not be any implied preemption of a State common law tort cause of action.

E. National Environmental Policy Act

NHTSA has analyzed this final rule for the purposes of the National Environmental Policy Act. The agency has determined that implementation of this action would not have any significant impact on the quality of the human environment.

F. Paperwork Reduction Act

Under the procedures established by the Paperwork Reduction Act of 1995, a person is not required to respond to a collection of information by a Federal agency unless the collection displays a valid OMB control number. This final rule would not establish any new information collection requirements.

G. National Technology Transfer and Advancement Act

Under the National Technology
Transfer and Advancement Act of 1995
(NTTAA) (Public Law 104–113), "all
Federal agencies and departments shall
use technical standards that are
developed or adopted by voluntary
consensus standards bodies, using such
technical standards as a means to carry
out policy objectives or activities
determined by the agencies and
departments." This Final Rule would
not adopt or reference any new industry
or consensus standards that were not
already present in FMVSS No. 108.

H. Civil Justice Reform

With respect to the review of the promulgation of a new regulation, section 3(b) of Executive Order 12988, "Civil Justice Reform" (61 FR 4729, February 7, 1996) requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) Clearly specifies the preemptive effect; (2) clearly specifies the effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct, while promoting simplification and burden reduction; (4) clearly specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. This document is consistent with that requirement.

Pursuant to this Order, NHTSA notes as follows. The preemptive effect of this final rule is discussed above. NHTSA notes further that there is no requirement that individuals submit a petition for reconsideration or pursue other administrative proceeding before they may file suit in court.

I. Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act of 1995 requires agencies to prepare a written assessment of the costs, benefits and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local or tribal governments, in the

aggregate, or by the private sector, of more than \$100 million annually (adjusted for inflation with base year of 1995). This final rule would not result in expenditures by State, local or tribal governments, in the aggregate, or by the private sector in excess of \$100 million annually.

J. Executive Order 13211

Executive Order 13211 (66 FR 28355, May 18, 2001) applies to any rulemaking that: (1) Is determined to be economically significant as defined under E.O. 12866, and is likely to have a significantly adverse effect on the supply of, distribution of, or use of energy; or (2) that is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action. This rulemaking is not subject to E.O. 13211.

K. Regulation Identifier Number (RIN)

The Department of Transportation assigns a regulation identifier number (RIN) to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. You may use the RIN contained in the heading at the beginning of this document to find this action in the Unified Agenda.

L. Privacy Act

Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (70 FR 19477–19478).

List of Subjects in 49 CFR Part 571

Imports, Motor vehicle safety, Motor vehicles, and Tires.

In consideration of the foregoing, NHTSA amends 49 CFR part 571 as set forth below.

PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

■ 1. The authority citation for Part 571 continues to read as follows:

Authority: 49 U.S.C. 322, 30111, 30115, 30117 and 30166; delegation of authority at 49 CFR 1.50.

2. Section 571.108 is amended by adding paragraphs S14.4.1.3.2.4, S14.4.1.3.2.5, S14.4.1.4.2.4, S14.1.4.2.5, and S14.4.1.4.2.6 to read as follows:

§ 571.108 Standard No.108; Lamps, reflective devices, and associated equipment.

S14.4.1.3.2.4 Green. Green is not acceptable if it is less saturated (paler), yellower, or bluer than the limit standards.

S14.4.1.3.2.5 Blue. Blue is not acceptable if it is less saturated (paler), greener, or redder than the limit standards.

S14.4.1.4.2.4 Green. The color of light emitted must fall within the following boundaries:

y = 0.73 - 0.73x (yellow boundary)

x = 0.63y - 0.04 (white boundary)

y = 0.50 - 0.50x (blue boundary)

S14.4.1.4.2.5 Restricted Blue. The color of light emitted must fall within the following boundaries:

y = 0.07 + 0.81x (green boundary)

x = 0.40 - y (white boundary)

x = 0.13 + 0.60y (violet boundary)

S14.4.1.4.2.6 Signal Blue. The color of light emitted must fall within the following boundaries:

y = 0.32 (green boundary)

x = 0.16 (white boundary)

x = 0.40 - y (white boundary)

x = 0.13 + 0.60y (violet boundary)

Issued on: November 28, 2012.

David L. Strickland,

Administrator.

[FR Doc. 2012-29284 Filed 12-3-12; 8:45 am]

BILLING CODE 4910-59-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 648

[Docket No. 120321209-2643-02]

RIN 0648-BC08

Fisheries of the Northeastern United States; Atlantic Mackerel, Squid, and Butterfish Fisheries; Framework Adjustment 5

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: NMFS is broadening the scope of individuals and entities approved to complete vessel fish hold capacity certifications for vessels issued Tier 1 and 2 limited access Atlantic mackerel permits under the Atlantic

List of Subjects in 48 CFR Parts 2, 11, 23, and 52

Government procurement.

Dated: July 6, 2011.

Laura Auletta,

Acting Director, Office of Governmentwide Acquisition Policy, Office of Acquisition Policy.

Therefore, DoD, GSA, and NASA propose amending 48 CFR parts 2, 11, 23, and 52 as set forth below:

1. The authority citation for 48 CFR parts 2, 11, 23, and 52 continues to read as follows:

Authority: 40 U.S.C. 121(c); 10 U.S.C. chapter 137; and 42 U.S.C. 2473(c).

PART 2—DEFINITIONS OF WORDS AND TERMS

§ 2.101 [Amended]

2. Amend section 2.101 by removing from paragraph (b)(2), in the definition "biobased product", the words "(including plant, animal, and marine materials) or" and adding "and" in its place.

PART 11—DESCRIBING AGENCY NEEDS

3. Amend section 11.302 by revising paragraph (c)(2) to read as follows:

§11.302 Policy.

(c) * * *

(2) For biobased products, agencies may not require, as a condition of purchase of such products, the vendor or manufacturer to provide more data than would typically be provided by other business entities offering products for sale to the agency, other than data confirming the biobased content of a product (see 7 CFR 2902.8).

PART 23—ENVIRONMENT, ENERGY AND WATER EFFICIENCY, RENEWABLE ENERGY TECHNOLOGIES, OCCUPATIONAL SAFETY, AND DRUG-FREE WORKPLACE

§23.404 [Amended]

- 4. Amend section 23.404 by removing from paragraph (e)(1) the words "(including plant, animal, and marine materials)".
- 5. Amend section 23.405 by revising paragraph (a)(2) and adding (a)(3) to read as follows:

§ 23.405 Procedures.

(a) * * *

(2) Biobased products. Contracting officers should refer to USDA's list of USDA-designated items (available through the Internet at http://

www.biopreferred.gov) and to their agencies' affirmative procurement program when purchasing supplies that contain biobased material or when purchasing services that could include supplies that contain biobased material.

(3) When acquiring recovered material or biobased products, the contracting officer may request information or data on such products, including on the recycled or biobased content or related standards of the products (see 11.302(c)).

* * * * *

§ 23.406 [Amended]

6. Amend section 23.406 by removing from paragraph (b) "http://www.usda.gov/biopreferred" and adding "http://www.biopreferred.gov" in its place.

PART 52—SOLICITATION PROVISIONS AND CONTRACT CLAUSES

- 7. Amend section 52.223-2 by-
- a. Revising the date of the clause;
- b. Removing from paragraph (b) "http://www.usda.gov/biopreferred" and adding http://www.biopreferred.gov in its place; and
- c. Adding paragraphs (c) and (d) to read as follows:

52.223-2 Affirmative Procurement of Biobased Products Under Service and Construction Contracts

* * * * *

Affirmative Procurement of Biobased Products Under Service and Construction Contracts (Date)

(c) In the performance of this contract, the Contractor shall—

- (1) Report to the cognizant Contracting Officer and the agency environmental manager on the product types and dollar value of any USDA-designated biobased products purchased by the Contractor during the previous year, between October 1 and September 30, in this contract;
 - (2) Submit this report no later than—
- (i) October 31 of each year during contract performance; and
- erformance; and
 (ii) At the end of contract performance; and
- (iii) Contact the cognizant environmental manager to obtain the preferred submittal format, if that format is not specified in this contract.
- (d) The cognizant environmental manager for this contract is:

[Contracting Officer shall insert full name, phone number, and email address or Web site for reporting.]

[FR Doc. 2011–17453 Filed 7–12–11; 8:45 am]

BILLING CODE 6820-EP-P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

[Docket No. NHTSA-2011-0101] RIN 2127-AK99

Federal Motor Vehicle Safety Standards; Lamps, Reflective Devices, and Associated Equipment

AGENCY: Department of Transportation (DOT), National Highway Traffic Safety Administration (NHTSA).

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: NHTSA is proposing to restore the blue and green color boundaries to Federal Motor Vehicle Safety Standard (FMVSS) No. 108, *Lamps, Reflective Devices and Associated Equipment*, that were removed when the agency published a final rule reorganizing the standard on December 4, 2007.

DATES: Comments to this proposal must be received on or before September 12, 2011.

ADDRESSES: You may submit comments, identified by the docket number in the heading of this document, by any of the following methods:

- Federal eRulemaking Portal: Go to http://www.regulations.gov. Follow the instructions for submitting comments on the electronic docket site by clicking on "Help" or "FAQ."
- Mail: Docket Management Facility, M–30, U.S. Department of Transportation, 1200 New Jersey Avenue, SE., West Building, Ground Floor, Room W12–140, Washington, DC 20590.
- Hand Delivery: U.S. Department of Transportation, 1200 New Jersey Avenue, SE., West Building, Ground Floor, Room W12–140, between 9 a.m. and 5 p.m. Eastern Time, Monday through Friday, except Federal holidays.

• Fax: 202–493–2251.
Regardless of how you submit comments, you should mention the docket number of this document.

You may call the Docket Management Facility at 202–366–9826.

Instructions: For detailed instructions on submitting comments and additional information on the rulemaking process, see the Public Participation heading of the Supplementary Information section of this document. Note that all comments received will be posted without change to http://www.regulations.gov, including any personal information provided.

Privacy Act: Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the Federal Register published on April 11, 2000 (65 FR 19477–78) or you may visit http://www.dot.gov/privacy.html.

Docket: For access to the docket to read background documents or comments received, go to http://www.regulations.gov, or the street address listed above. Follow the online instructions for accessing the dockets.

FOR FURTHER INFORMATION CONTACT: For technical issues: Mr. Markus Price, Office of Crash Avoidance Standards, NHTSA, 1200 New Jersey Avenue, SE., West Building, Washington, DC 20590 (*Telephone*: (202) 366–0098) (*Fax*: (202) 366–7002).

For legal issues: Mr. Thomas Healy, Office of the Chief Counsel, NHTSA, 1200 New Jersey Avenue, SE., West Building, Washington, DC 20590 (Telephone: (202) 366–2992) (Fax: (202) 366–3820).

SUPPLEMENTARY INFORMATION:

I. Background

NHTSA published a NPRM on December 30, 2005 ¹ to reorganize FMVSS No. 108 and improve the clarity of the standard's requirements thereby increasing its utility for regulated parties. It was the agency's goal during the rewrite process to make no substantive changes to the requirements of the standard.

FMVSS No. 108 has been in existence since 1968. The standard had been amended on an ad hoc basis over time resulting in a patchwork organization of the standard. Regulated parties had stated that the standard was difficult to interpret because of its organization. In response to these concerns the agency sought to rewrite the standard to make it more understandable by adopting a simplified numbering scheme, to improve organization by grouping related materials in a more logical and consistent sequence, and to reduce the certification burden of regulated parties who previously needed to review a few dozen third-party documents. The agency issued the December 30, 2005, NPRM in an attempt to address these concerns.

Based on the comments received in response to the NPRM, NHTSA published a final rule on December 4,

2007,2 amending FMVSS No. 108 by reorganizing the regulatory text so that it provides a more straightforward and logical presentation of the applicable regulatory requirements; incorporating important agency interpretations of the existing requirements; and reducing reliance on third-party documents incorporated by reference. The preamble of the final rule again stated that the rewrite of FMVSS No. 108 was administrative in nature and would have no impact on the substantive requirements of the standard. The final rule made several changes to the proposal contained in the NPRM including removing the blue and green color boundary requirements from paragraph S14.4.1.3.2.

On August 11, 2008, SABIC Innovative Plastics sent a letter to NHTSA claiming that the agency did not allow for public comment when it made the decision to remove the blue and green color boundaries from the standard. SABIC further argued that in removing the blue and green color boundaries from paragraph S14.4.1.3.2, the agency substantively changed the requirements of FMVSS No. 108 during the rewrite process.

II. Green and Blue Color Boundaries

Previous to the rewrite of the standard, paragraph S5.1.5 of FMVSS No. 108 required that the color of all lamps required by the standard comply with SAE J578c, Color Specification for Electric Signal Lighting Devices, (FEB 1977). SAE J578c contained color boundary definitions for red, yellow, white, green, restricted blue, and signal blue light. The NPRM included the boundary definition for the colors blue and green, but left out restricted blue. In the final rule the agency removed the color boundary definitions for green and blue from paragraph S14.4.1.3.2, retaining only the definitions for the red, vellow, and white color boundaries.

The agency is aware that, although neither blue nor green are directly used within the standard, it is possible to use these color boundaries to certify a material to the outdoor exposure test located in the paragraphs of S14.4.2.2. Prior to the reorganization final rule, a manufacturer could separately certify both a clear (white) material and a blue material to the haze test. The blue material alone could not be used in a lamp because the lamp itself would not emit the color of light required by the standard (only white, amber, and red lights are permitted). Once individually certified to the three year haze test, however, the blue and clear material

could be mixed to produce a clear material with a blue tint, which could then be used in a lamp lens provided the lamp itself emits light within the white color boundary. Under the standard, the mixed material can be certified to the haze test without an additional three years of testing.

The agency recognizes that removing the color definitions for blue and green creates a substantive change to the requirements of FMVSS No. 108. Since it was not the agency's intention to create any substantive modifications to the standard, as stated in the NPRM and preamble of the final rule, the agency is proposing to amend FMVSS No. 108 to add color boundary definitions for green, restricted blue and signal blue so that the requirements of the rewrite coincide with those of the old standard. Further, the agency notes that these additional color boundary definitions have no impact on color that any lamp must emit. The agency is not proposing to change the color requirements for any lamp mandated by FMVSS No. 108.

III. Costs, Benefits, and the Proposed Compliance Date

Because this proposal only restores an existing requirement to the standard, the agency does not anticipate that there would be any costs or benefits associated with this rulemaking action. Accordingly, the agency did not conduct a separate economic analysis for this rulemaking.

The agency proposes an effective date of December 1, 2012, should a final rule be issued, to coincide with the effective date of the FMVSS No. 108 administrative rewrite.

IV. Public Participation

How do I prepare and submit comments?

Your comments must be written and in English. To ensure that your comments are correctly filed in the Docket, please include the docket number of this document in your comments. Your comments must not be more than 15 pages long.³ We established this limit to encourage you to write your primary comments in a concise fashion. However, you may attach necessary additional documents to your comments. There is no limit on the length of the attachments.

Please submit your comments by any of the following methods:

• Federal eRulemaking Portal: go to http://www.regulations.gov. Follow the instructions for submitting comments on the electronic docket site by clicking on "Help" or "FAQ."

¹ 70 FR 77454, (Dec. 30, 2005).

² 72 FR 68234, (Dec. 4, 2007).

³ See 49 CFR 553.21.

- *Mail:* Docket Management Facility, M–30, U.S. Department of Transportation, West Building, Ground Floor, Rm. W12–140, 1200 New Jersey Avenue, SE., Washington, DC 20590.
- Hand Delivery or Courier: West
 Building Ground Floor, Room W12–140,
 1200 New Jersey Avenue, SE., between
 9 a.m. and 5 p.m. Eastern Time, Monday
 through Friday, except Federal holidays.

• Fax: (202) 493–2251.

If you are submitting comments electronically as a PDF (Adobe) file, we ask that the documents submitted be scanned using an Optical Character Recognition (OCR) process, thus allowing the agency to search and copy certain portions of your submissions.⁴

Please note that pursuant to the Data Quality Act, in order for substantive data to be relied upon and used by the agency, it must meet the information quality standards set forth in the Office of Management and Budget (OMB) and DOT Data Quality Act guidelines. Accordingly, we encourage you to consult the guidelines in preparing your comments. OMB's guidelines may be accessed at http://www.whitehouse.gov/omb/fedreg/reproducible.html. DOT's guidelines may be accessed at http://dmses.dot.gov/submit/DataQualityGuidelines.pdf.

How can I be sure that my comments were received?

If you submit your comments by mail and wish Docket Management to notify you upon its receipt of your comments, enclose a self-addressed, stamped postcard in the envelope containing your comments. Upon receiving your comments, Docket Management will return the postcard by mail.

How do I submit confidential business information?

If you wish to submit any information under a claim of confidentiality, you should submit three copies of your complete submission, including the information you claim to be confidential business information, to the Chief Counsel, NHTSA, at the address given above under **FOR FURTHER INFORMATION CONTACT**. When you send a comment containing information claimed to be confidential business information, you should include a cover letter setting forth the information specified in our confidential business information regulation.⁵

In addition, you should submit a copy, from which you have deleted the

claimed confidential business information, to the Docket by one of the methods set forth above.

Will the agency consider late comments?

We will consider all comments received before the close of business on the comment closing date indicated above under **DATES**. To the extent possible, we will also consider comments received after that date. Therefore, if interested persons believe that any new information the agency places in the docket affects their comments, they may submit comments after the closing date concerning how the agency should consider that information for the final rule.

If a comment is received too late for us to consider in developing a final rule (assuming that one is issued), we will consider that comment as an informal suggestion for future rulemaking action.

How can I read the comments submitted by other people?

You may read the materials placed in the docket for this document (e.g., the comments submitted in response to this document by other interested persons) at any time by going to http://www.regulations.gov. Follow the online instructions for accessing the dockets. You may also read the materials at the Docket Management Facility by going to the street address given above under ADDRESSES. The Docket Management Facility is open between 9 a.m. and 5 p.m. Eastern Time, Monday through Friday, except Federal holidays.

V. Regulatory Notices and Analyses

A. Executive Order 12866, Executive Order 13563, and DOT Regulatory Policies and Procedures

NHTSA has considered the impact of this rulemaking action under Executive Order 12866, Executive Order 13563, and the Department of Transportation's regulatory policies and procedures. This rulemaking document was not reviewed by the Office of Management and Budget under E.O. 12866, "Regulatory Planning and Review." It is not considered to be significant under E.O. 12866 or the Department's regulatory policies and procedures.

B. National Environmental Policy Act

We have reviewed this proposal for the purposes of the National Environmental Policy Act and determined that it would not have a significant impact on the quality of the human environment.

C. Regulatory Flexibility Act

Pursuant to the Regulatory Flexibility Act (5 U.S.C. 601 et seq., as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions). The Small Business Administration's regulations at 13 CFR part 121 define a small business, in part, as a business entity "which operates primarily within the United States." 13 CFR 121.105(a). No regulatory flexibility analysis is required if the head of an agency certifies the rule will not have a significant economic impact on a substantial number of small entities.

NHTSA has considered the effects of the proposed rule under the Regulatory Flexibility Act. I certify that this proposed rule would not have a significant economic impact on a substantial number of small entities. This proposal restores the green and blue color boundaries contained in the currently applicable version of FMVSS No. 108 to the administrative rewrite of FMVSS No. 108 which has not yet taken effect. Accordingly, we do not anticipate that this proposal would have a significant economic impact on a substantial number of small entities.

D. Executive Order 13132 (Federalism)

NHTSA has examined today's final rule pursuant to Executive Order 13132 (64 FR 43255, August 10, 1999) and concluded that no additional consultation with States, local governments or their representatives is mandated beyond the rulemaking process. The agency has concluded that the rulemaking would not have sufficient federalism implications to warrant consultation with State and local officials or the preparation of a federalism summary impact statement. The final rule would not have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'

E. Executive Order 12988 (Civil Justice Reform)

Pursuant to Executive Order 12988, "Civil Justice Reform," ⁶ NHTSA has

⁴ Optical character recognition (OCR) is the process of converting an image of text, such as a scanned paper document or electronic fax file, into computer-editable text.

⁵ See 49 CFR part 512.

⁶⁶¹ FR 4729 (Feb. 7, 1996).

considered whether this rulemaking would have any retroactive effect. This proposed rule does not have any retroactive effect.

F. Unfunded Mandates Reform Act

Section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA) requires Federal agencies to prepare a written assessment of the costs, benefits, and other effects of a proposed or final rule that includes a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of more than \$100 million in any one year (adjusted for inflation with base year of 1995).

Before promulgating a rule for which a written statement is needed, section 205 of the UMRA generally requires NHTSA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows NHTSA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the agency publishes with the final rule an explanation why that alternative was not adopted.

This proposed rule is not anticipated to result in the expenditure by state, local, or tribal governments, in the aggregate, or by the private sector in excess of \$100 million annually. The cost impact of this proposed rule is expected to be \$0. Therefore, the agency has not prepared an economic assessment pursuant to the Unfunded Mandate Reform Act.

G. Paperwork Reduction Act

Under the procedures established by the Paperwork Reduction Act of 1995 (PRA), a person is not required to respond to a collection of information by a Federal agency unless the collection displays a valid OMB control number. This proposed rule does not contain any collection of information requirements requiring review under the PRA.

H. Executive Order 13045

Executive Order 13045 ⁷ applies to any rule that: (1) Is determined to be economically significant as defined under E.O. 12866, and (2) concerns an environmental, health or safety risk that NHTSA has reason to believe may have a disproportionate effect on children. If

the regulatory action meets both criteria, we must evaluate the environmental health or safety effects of the proposed rule on children, and explain why the proposed regulation is preferable to other potentially effective and reasonably feasible alternatives considered by us.

This proposed rule does not pose such a risk for children. The primary effects of this proposal are to amend the lighting standard to restore the green and blue color boundaries.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act (NTTAA) requires NHTSA to evaluate and use existing voluntary consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law (e.g., the statutory provisions regarding NHTSA's vehicle safety authority) or otherwise impractical.

Voluntary consensus standards are technical standards developed or adopted by voluntary consensus standards bodies. Technical standards are defined by the NTTAA as "performance-based or design-specific technical specification and related management systems practices." They pertain to "products and processes, such as size, strength, or technical performance of a product, process or material."

Examples of organizations generally regarded as voluntary consensus standards bodies include the American Society for Testing and Materials (ASTM), the Society of Automotive Engineers (SAE), and the American National Standards Institute (ANSI). If NHTSA does not use available and potentially applicable voluntary consensus standards, we are required by the Act to provide Congress, through OMB, an explanation of the reasons for not using such standards.

This proposal would not adopt or reference any new industry or consensus standards that were not already present in FMVSS No. 108.

J. Executive Order 13211

Executive Order 13211 ⁸ applies to any rule that: (1) Is determined to be economically significant as defined under E.O. 12866, and is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (2) that is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action. If the

This proposal restores the green and blue color boundaries contained in the currently applicable version of FMVSS No. 108 to the administrative rewrite of FMVSS No. 108 which has not yet taken effect. Therefore, this proposed rule will not have any adverse energy effects. Accordingly, this proposed rulemaking action is not designated as a significant energy action.

K. Regulation Identifier Number (RIN)

The Department of Transportation assigns a regulation identifier number (RIN) to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. You may use the RIN contained in the heading at the beginning of this document to find this action in the Unified Agenda.

L. Plain Language

Executive Order 12866 requires each agency to write all rules in plain language. Application of the principles of plain language includes consideration of the following questions:

- Have we organized the material to suit the public's needs?
- Are the requirements in the rule clearly stated?
- Does the rule contain technical language or jargon that isn't clear?
- Would a different format (grouping and order of sections, use of headings, paragraphing) make the rule easier to understand?
- Would more (but shorter) sections be better?
- Could we improve clarity by adding tables, lists, or diagrams?
- What else could we do to make the rule easier to understand?

If you have any responses to these questions, please include them in your comments on this proposal.

M. Privacy Act

Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an organization, business, labor union, etc.). You may review DOT's complete Privacy Act statement in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70; Pages 19477–78) or you

regulatory action meets either criterion, we must evaluate the adverse energy effects of the proposed rule and explain why the proposed regulation is preferable to other potentially effective and reasonably feasible alternatives considered by NHTSA.

⁷62 FR 19885 (Apr. 23, 1997).

⁸⁶⁶ FR 28355 (May 18, 2001).

may visit http://www.dot.gov/privacy.html.

In consideration of the foregoing, NHTSA proposes to amend 49 CFR part 571 as set forth below.

PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

1. The authority citation for part 571 continues to read as follows:

Authority: 49 U.S.C. 322, 30111, 30115, 30117, 30166; delegation of authority at 49 CFR 1.50.

§ 571.108 [Amended]

Section 571.108 is amended effective December 1, 2012 by adding paragraphs S14.4.1.4.2.4, S14.1.4.2.5, and S14.4.1.4.2.6 to read as follows:

* * * * *

S14.4.1.4.2.4 Green. The color of light emitted must fall within the following boundaries:

y = 0.73 - 0.73x (yellow boundary); y = 0.50 - 0.50x (blue boundary);

x = 0.63y - 0.04 (white boundary). S14.4.1.4.2.5 Restricted Blue. The color of light emitted must fall within the following boundaries:

y = 0.07 + 0.81x (green boundary);

x = 0.40 - y (white boundary);

x = 0.13 + 0.60y (violet boundary).

S14.4.1.4.2.6 Signal Blue. The color of light emitted must fall within the following boundaries:

y = 0.32 (green boundary);

x = 0.40 - y (white boundary);

x = 0.16 (white boundary);

x = 0.13 + 0.60y (violet boundary).

* * * * * * Issued on: July 7, 2011.

Christopher J. Bonanti,

Associate Administrator for Rulemaking. [FR Doc. 2011–17658 Filed 7–12–11; 8:45 am]

BILLING CODE 4910-59-P



October 22, 2013

The Honorable David L. Strickland Administrator National Highway Traffic Safety Administration 1200 New Jersey Avenue S.E., West Building Washington D.C. 20590-0001

RE: Notice of update of SAE J576 to include specification for Diffusion Polymers for automotive lighting applications

Dear Administrator Strickland:

The purpose of this letter is to provide notification of an update to SAE J576-Plastic Material or Materials for Use in Optical Parts Such as Lenses and Reflex Reflectors of Motor Vehicle Lighting Devices, effective February 2010. This updated version of J576 includes a method to evaluate "degradation in performance caused by weathering exposure of diffusion material(s) that cannot be measured by current test methods."

The changes in SAE J576 (FEB 2010) provide for the use of controlled light scattering plastic materials, herein referred to as Diffusing Plastic Materials. Diffusing Plastic Materials intentionally scatter transmitted light to specific intended levels as defined in SAE J576 (FEB 2010) as having an initial unexposed haze value greater than 30% when measured in accordance with ASTM D1003. The ASTM D1003 scope does not allow for materials with measured values greater than 30%. Diffusing Plastic Materials cannot be evaluated for durability using the conventional "increase of haze" methodology since measurement of haze of Diffusing Plastic Materials is not within the scope of ASTM D1003. This new evaluation methodology is limited to Diffusing Plastic Materials only and requires a more stringent maintenance of luminous transmittance. All other existing exposure, testing and requirements remain unchanged for all materials. No other changes have been made or allowed in the February 2010 revision for transparent plastic materials. Definitions have been incorporated as necessary to define this Diffusing Plastic Materials.

SAE and the SAE Lighting Systems Group believe that this revised document strives to maintain the relevance of standards within the context of changing technologies in the automotive lighting field that could not be anticipated or addressed at the time of the publication of the existing text (SAE J576 JUL91). SAE and the SAE Lighting Systems Group further believe that if and when NHTSA amends the current FMVSS lighting standard, referencing SAE J576 (FEB 2010) would benefit the safety of the public as well as that of the automotive industry.

Sincerely,

Jack Pokrzywa

Business Unit Leader

Global Ground Vehicle Standards

cc: Mr. Timothy P. Mellon, Director, Government Affairs, SAE International

Mr. Bart P. Terburg, Chairman, SAE Lighting Systems Group



Administration

NOV 6 2009

1200 New Jersey Avenue SE. Washington, DC 20590

Mr. Jim Wilson Marketing Director, Lighting Sabic Innovative Plastics Two Towne Square Southfield, MI 48076

Dear Mr. Wilson:

This responds to your letter regarding requirements for inner lenses in Federal Motor Vehicle Safety Standard (FMVSS) No. 108, <u>Lamps</u>, <u>Reflective Devices</u>, <u>and Associated Equipment</u>. Specifically, you asked whether inner lenses are subject to certain performance requirements of the version of FMVSS No. 108 that are scheduled to take effect on December 1, 2009. The answer is that inner lenses are required to meet the haze test requirements, similar to the way they are in the currently applicable version of FMVSS No. 108.

By way of background, the National Highway Traffic Safety Administration (NHTSA) is authorized by the National Traffic and Motor Vehicle Safety Act (Safety Act) to issue FMVSSs that set performance requirements for new motor vehicles and new items of motor vehicle equipment (see 49 U.S.C. Chapter 301). NHTSA does not provide approvals of motor vehicles or motor vehicle equipment. Instead, manufacturers are required to self-certify that their products conform to all applicable safety standards that are in effect on the date of manufacture. NHTSA selects a sampling of new vehicles and equipment each year to determine their compliance with applicable FMVSSs. If our testing or examination reveals an apparent noncompliance, we may require the manufacturer to remedy the noncompliance, and may initiate an enforcement proceeding if necessary to ensure that the manufacturer takes appropriate action.

In your letter, you state you seek confirmation that FMVSS No. 108 does not require plastic materials used for inner lenses to meet the performance requirements in \$14.4.2.2.4 when they are covered by outer material meeting the requirements of that section and not exposed directly to sunlight. Neither the currently applicable version of FMVSS No. 108, nor the version of the standard that becomes effective on December 1, 2009 (hereinafter, "the rewrite)," supports that position.



100

For reference, paragraph S5.1.2 of FMVSS No. 108 reads as follows:

S5.1.2 Plastic materials used for optical parts such as lenses and reflectors shall conform to SAE Recommended Practice J576 JUL91, except that:

(a) Plastic lenses (other than those incorporating reflex reflectors) used for inner lenses or those covered by another material and not exposed directly to sunlight shall meet the requirements of paragraphs 3.3 and 4.2 of SAE J576 JUL91 when covered by the outer lens or other material; [emphasis added]¹....

We interpret this requirement as follows. The requirement in S5.1.2 which states that plastic materials shall conform to SAE J576 JUL91 is the general requirement. The subparagraphs ((a) through (g)), are exceptions to this requirement. Therefore, the exception described in subparagraph (a) requires plastic lenses used for inner lenses to meet the specifications of paragraphs 3.3 and 4.2 of SAE J576 JUL91 while covered by the outer lens. This is instead of being required to meet these specifications while directly exposed to sunlight.² The inner lenses are not, as you suggest, fully excluded from the general test requirements in S5.1.2.

We believe that the relevant paragraph S14.4.2.2.4 in the rewrite is substantively identical. For reference, that paragraph reads as follows:

S14.4.2.2.4 *Performance requirements*. Plastic lenses, other than those incorporating reflex reflectors, used for inner lenses or those covered by another material and not exposed directly to sunlight must meet the optical material test requirements when covered by the outer lens or other material.

We interpret this paragraph to establish the same requirements as paragraph S5.1.2 and S5.1.2(a) in the current standard. With regard to plastic used for inner lenses, and not exposed directly to sunlight, they must "meet the optical material test requirements" when covered by the outer lens. This is the same as is currently required by FMVSS No. 108.

You also provide an analysis as to why you believe that inner lenses are not required to be certified to the specifications of S5.1.2. We respond to that analysis below.

In your letter, you state that in a 1970 final rule (35 FR 16840, October 31, 1970), NHTSA "made clear that inner lenses would be considered to be protected when covered by an outer lens and not directly exposed to sunlight." We have reviewed the final rule at

¹ For reference, paragraphs 3.3 and 4.2 of SAE Recommended Practice J576, "Plastic Materials for Use in Optical Parts such as Lenses and Reflex Reflectors of Motor Vehicle Lighting Devices," revised July 1991, relate to the "Outdoor Exposure Tests" and the "After Outdoor Exposure" requirements, respectively. SAE J576 has been incorporated by reference into FMVSS No. 108.

² The language in paragraph 3.3 of SAE J576 JUL91 does not specify that protected inner lenses can be covered by the outer lens during the outdoor exposure tests. It specifies a shorter, but otherwise similar, outdoor exposure test than the one for exposed outer lenses.

issue and have not found a relevant difference between that version and the current version. It too states that "[p]lastic materials used as inner lenses... and not exposed directly to sunlight shall meet the requirements of paragraphs 3.4 and 4.2 of SAE J576b when covered by the outer lens or other material."

Finally, we note you argued that "the fact that inner lenses are 'protected' is critical when applying the SAE Recommended Practice upon which the standard is based." We agree that the lenses you describe in this letter would be considered "protected." However, merely because a lens is protected does not mean it is not subject to a weathering test. Instead, according to the SAE Recommended Practice referenced in FMVSS No. 108 (SAE J576 JUL91), protected lenses are subject to test requirements — albeit less stringent requirements than "exposed" lenses (a 6-month weathering period, instead of 3 years).

If you have any further questions, please contact Ari Scott of my staff at (202) 366-2992.

Sincerely,

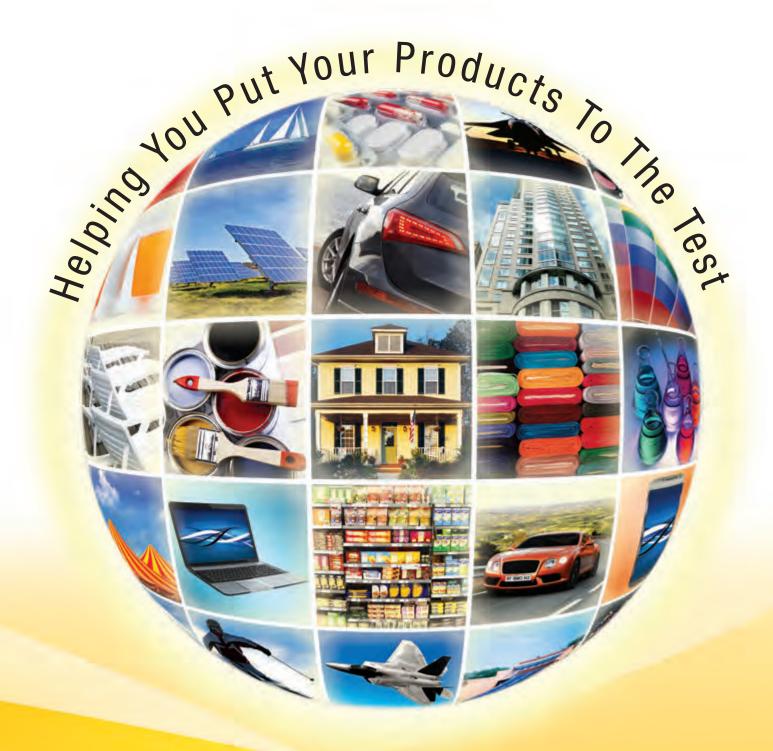
O. Kevin Vincent Chief Counsel

O. Lein Wit

³ 70 FR 16843.



ACCELERATING YOUR EXPERTISE



THE GLOBAL LEADER IN
PRODUCT DURABILITY, PERFORMANCE &
WEATHERING TESTING INSTRUMENTS & SERVICES



Instruments

Accelerated Weathering * Corrosion * Flammability * Solar Environmental * Technical Lighting

Ci Series Weather-Ometers



Atlas' flagship accelerated weathering instruments offer superior performance, innovative features, and large capacity.

- Water-cooled xenon arc lamps and advanced filter technology deliver the best simulation of natural sunlight
- Best-in-class uniformity for irradiance, temperature, relative humidity and spray
- Intuitive touch screen controls
- Custom testing capabilities

Xenotest® Instruments



These premium air-cooled accelerated weathering instruments offer an array of options to meet virtually all global weathering and lightfastness testing requirements.

- Designed with state-of-the-art controls
- On-rack radio-controlled sensor technology for superior monitoring of light and temperature
- High water and power efficiency

Corrosion Cabinets



The most sophisticated and versatile corrosion and salt fog cabinets available. Capable of replicating automatic cycling between several environmental conditions to reduce the need to move or otherwise handle test specimens.

- Design maximizes testing volume
- Large solution reservoir
- Optional features allow for simulation of several environmental conditions

SUNTEST® Family



The most widely used flatbed xenon test chambers available in tabletop or free standing models to meet lower testing capacity needs. Features include:

- Optical light filters to simulate indoor/ outdoor sunlight
- A variety of accessories ideal for testing realistic end-use conditions
- Best-in-class flatbed irradiance and temperature uniformity

UVTest



An economical fluorescent/UV weathering test instrument for product screening at lower operating costs.

- Simple touch screen operation and control in several languages
- Patented irradiance calibration safety access ports
- Remote Ethernet data acquisition application
- Recirculating spray water option

Flammability Chambers



Atlas flammability chambers offer unmatched accuracy, repeatability and safety when determining the burn rates and resistance of various materials.

- All chambers are easy to install and operate
- Specimen holders available to accommodate a variety of material types
- Chambers are available for appliance, aircraft and automotive applications

Solar Simulation Systems



Atlas Custom Systems designs and builds custom solar simulation systems such as walkin chambers or full-scale test facilities. These full scale test facilities use a series of highly coordinated metal halide lights to provide uniform radiant energy to meet the demanding testing needs of many industries.

Solar Environmental Chambers



A group of integrated, easy-to-use test chambers for various solar and environmental applications. These instruments combine environmental simulation with metal halide lighting technology and are ideal for testing medium to large sized automotive, plastics, electronics and 3D components, finished products as well as PV modules.

Technical Lighting Systems



Atlas/KHS technical lighting systems are designed for high-speed photography and video. These systems are ideal for crash testing and other safety experiments, custom designed to match the complex illumination requirements of various test configurations. Available with conventional HMI light sources or the latest LED technology, these lighting systems offer an array of solutions for analytical testing of high speed events.

Our mission is to help our customers worldwide provide the most reliable and durable product solutions through our combined experience and expertise in weathering instruments and testing, custom capabilities, consulting and global support.

Services

Natural & Accelerated Weathering Testing * Evaluations * Consulting * Technical Support * Client Education

Natural Weathering Services



Atlas offers outdoor weathering sites worldwide to ensure factors from a variety of climates can be tested.

- Static Exposure Testing
- ◆ Sun Tracking Exposure Testing
- ◆ EMMAQUA® Accelerated Outdoor Testing
- Ultra-Accelerated Weathering Testing
- Automotive Exposure Testing (Samples, Components, Complete Vehicles)

Evaluation Services



Atlas offers a wide range of evaluation and measurement services for your specimens during and after the weathering process.

- Instrumental Color/Gloss Measurements
- Visual Evaluations
- ◆ Photography/IR Imaging
- Emittance
- ◆ Spectral Transmittance/Reflectance
- ◆ Solar Reflectance Index
- Additional Optical Property Measurements

Consulting Solutions

SOLUTION

PROBLEM



Accelerated Laboratory Weathering Services

Atlas Weathering Services Group operates one of the largest networks of ISO/IEC 17025 accredited accelerated weathering testing laboratories in the world. Our indoor exposure labs offer artificial accelerated weathering tests and a variety of other environmental test programs, all designed to accurately simulate true enduse conditions and meet global weathering standards.

Atlas Consulting Solutions offers design

and strategies. Our international group of

weathering experts help you achieve your

and implementation of environmental

durability testing methods, programs,



objectives through all stages of the value chain from materials to components, systems to end-use products.

Worldwide Technical Support



Proper maintenance is critical in order for your instrument to operate at peak performance. Atlas' AMECARE Performance Services Program ensures that your instrument will operate optimally at all times. Benefits include:

- Preventative maintenance inspections
- Scheduled ISO accredited calibrations (where available)
- Detailed service reports with professional assessment of key components

Client Education & Training

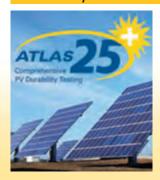
Atlas offers an array of resources designed to advance your weathering education and provide you with the knowledge you need to successfully meet your testing requirements. Events include:

• Seminars

• Workshops

- Webcasts
- ◆ In-House Programs
- Technical Conferences

Solar Industry Solutions



Atlas offers a complete portfolio of testing services to evaluate the performance, durability and reliability of solar cells, modules, complete arrays, concentrated solar power products and solar thermal collectors. Atlas also offers its proprietary Atlas 25^{+®} long-term durability testing program for solar modules.



Ultra-Accelerated EMMA®







THE BENEFITS OF ULTRA-ACCELERATED TESTING

What is the Ultra-Accelerated EMMA®?

The Ultra-Accelerated EMMA (UA-EMMA) is Atlas' latest advancement in natural exposure testing. This new outdoor testing device delivers approximately 10-12 years of equivalent radiation exposure as would be received in a standard outdoor testing rack in South Florida in a single year.

The system achieves this accelerated exposure through a patented "cool mirror" technology that has very high reflectance in the UV and near visible wavelength ranges while attenuating reflectance in the longer wavelength visible and IR portions of the solar spectrum.



What are the Advantages?

The new UA-EMMA system allows for greatly accelerated testing while fulfilling three critical testing requirements:

- Exposes many different types of materials to ultra-high UV irradiance
- Maintains high fidelity to the natural solar UV spectrum
- Keeps specimens at acceptable exposure temperatures

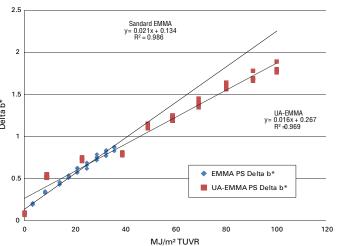
Black Panel Temperature Performance

UA-EMMA vs. Standard EMMA Data

EMMA BACKED

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Comparison of Polystyrene (PS) Reference Material in Standard EMMA and UA-EMMA by UV Radiant Exposure



Atlas' DSET Laboratories relocates from Phoenix to New River, Arizona. The EMMAQUA device is redesigned with a steel framework and more efficient spray 1958 delivery system

... UA-EMMA UNBACKED



15.56



EMMAQUA+®, the next generation of accelerated weathering devices, is introduced. Advancements include individual cycle programming, black panel temperature control, and altazimuth solar tracking for more efficient delivery of full-spectrum solar

1986

Ideal Materials for UA-EMMA® Testing

- Materials that require a long service life
- Transparent and glazed materials
- Temperature sensitive materials such as PVC
- Coatings applied to metal panels
- Materials that perform well in EMMA or EMMAQUA exposure testing

EMMAQUA® Weathering Standards

The table below lists selected standards for EMMAQUA exposure. For details, refer to the individual standards. Test methods which are proprietary to individual companies and which also specify Fresnel-based exposure methods are not listed here.

EMMAQUA STANDARD	SCOPE	COUNTRY
ISO 877-3	Plastics	International
ASTM D3841	Glass-fiber reinforced polyester	USA
ASTM D4141	Coatings	USA
ASTM D4364	Plastics	USA
ASTM D5722	Coated hardboard	USA
ASTM E1596	PV modules	USA
ASTM G90	Non-metallic materials	USA
SAE J576	Optical automotive plastics	USA
SAE J1961	Automotive exterior	USA
SAE-AMS-T-22085	Preservation sealing tape	USA
JIS Z2381	General	Japan

Applications

Agricultural Films

Building Materials

Paints & Coatings

Elastomers

Packaging

Plastics

Roofing

Sealants

Automotive Exteriors

Glass (Architectural & Automotive)

Adhesives

The MQ3K is launched, utilizing state-of-theart technology in computer-controlled cycle programming, more accurate altazimuth solar tracking, one-touch start/stop, error sensing feedback and the most-specular mirrors available.



Atlas introduces four patented suites of Temperature-Controlled EMMAQUA. (Static.) Night, Dynamic Temperature and Variable Irradiance Control). This breakthrough allows for the testing of materials that are sensitive to thermal buildup.

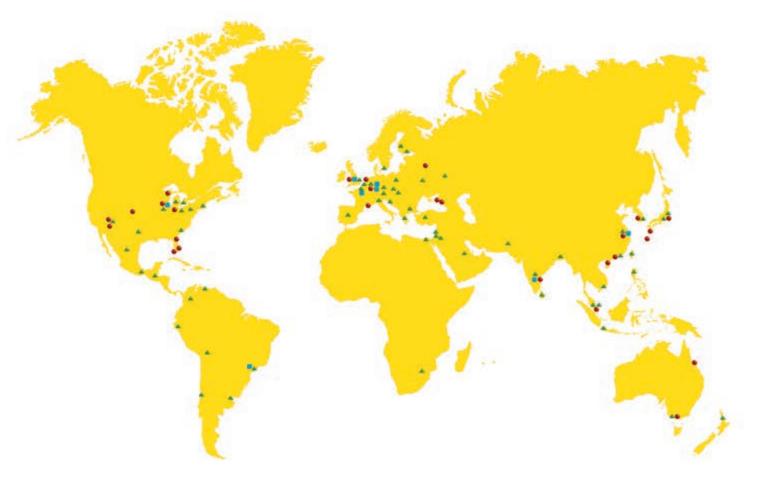
Atlas introduces the UA-EMMA the latest advancement in outdoor accelerated testing. This device couples the EMMA platform with a new patented mirror system, optimizing real-world correlation.



The first EMMAQUA® device, constructed with a wooden frame and sheet metal skin. is patented, manufactured and placed into

11.08

2004



Global Support, Weathering Exposure Sites & Laboratories

Corporate Offices

Chicago, Illinois USA Linsengericht, Germany Shanghai, China São Paulo, Brazil Élancourt, France Mörfelden-Walldorf, Germany Bangalore, India Leicester, United Kingdom

Outdoor Exposure Sites & Laboratories

Miami, Florida USA • Phoenix, Arizona USA • Sanary, France • Chicago, Illinois USA • Duisburg, Germany • Leicester, United Kingdom Hoek van Holland, The Netherlands • Chennai, India • Prescott, Arizona USA • Loveland, Colorado USA • Medina, Ohio USA Keys, Florida USA • Jacksonville, Florida USA • Alberta, Michigan USA • Hainan, China • Guangzhou, China Seosan, Korea • Miyakojima, Okinawa, Japan • Choshi, Japan • Kirishima, Japan Singapore • Melbourne, Australia • Townsville, Australia • Novorossiysk, Russia Gelendzhik, Russia • Moscow, Russia

▲ Local Sales & Service Support

To contact your local Atlas Sales representative please visit http://atlas-mts.com/contact/local-representatives/
For general inquiries please contact us at atlas.info@ametek.com

www.atlas-mts.com

Real Weathering Test Solutions

DEPLOYING PRECISION AND SPEED FOR REAL-WORLD RESULTS





Welcome

to Arizona Desert Testing, LLC (AZTEST),

where capability, climate and client service deliver **rapid** and **accurate** weathering test results.

From accelerated to natural, exterior to interior, our range of weathering solutions provide data-driven and empirical findings to evaluate product and material performance.

It is a fact that time and the elements take their toll on products; ensure yours pass the test with our spectrum of weathering services.



ANALYZING
PRODUCT PERFORMANCE
OVER TIME IS KEY
TO ITS SUCCESS

ACCELERATE YOUR RESULTS
WITH AZTEST SERVICES

The Arizona desert is an ideal environment for weathering studies. Blistering heat, extreme aridity and near-constant sunshine combine to create a virtually unmatched outdoor laboratory for benchmarking product durability under harsh conditions.

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testing that measures the effect of climatic forces	0

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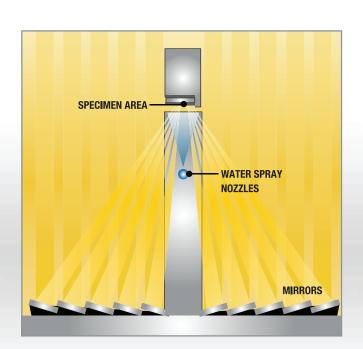
ACUVEX® for exterior materials

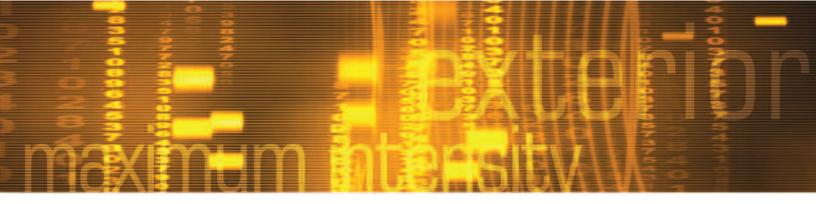
AZTEST's proprietary ACUVEX® for Exterior Materials—Accurate Controlled Ultra Violet Exposure—is an engineered solution that accelerates the effects of material weathering. Its innovative design concentrates sunlight for maximum intensity and measures the related effects on materials.

HOW ACUVEX WORKS

Each ACUVEX tracker contains 10 specular—highly reflective—mirrors that focus sunlight onto an air-cooled specimen area as required by ASTM G90—Standard Practice for Performing Accelerated Outdoor Weathering Using Concentrated Natural Sunlight. Specimens face the mirrors and are mounted upside down onto a specimen target area. Tracker units consist of two ACUVEX test machines mounted on a single tracker, which moves in azimuth (rotation) and elevation to keep the specimen area in focus. Temperatures are maintained by a fan blowing ambient air over the specimen surfaces.

Because of AZTEST's technology and the desert climate, ACUVEX specimens receive about five times more ultraviolet radiation in a year as compared to a southern Florida outdoor exposure.







HOW ACUVEX® TESTS WATER EFFECTS

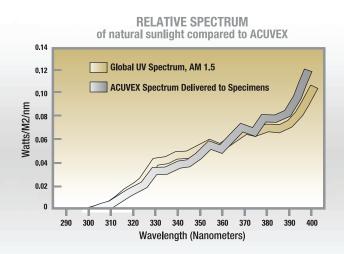
High-purity water sprays are used to simulate the effects of more humid climates like Florida . The water must contain less than 1.0 ppm TDS (total dissolved solids) and less than 0.2 ppm silica to comply with ASTM G90. ACUVEX spray cycles are shown below:

SPRAY CYCLE	DESCRIPTION
CYCLE 1*	8-minute water sprays every hour during the day with three 8-minute water sprays at night
CYCLE 2*	No water sprays
CYCLE 3*	3-minute water sprays every 15 minutes at night
AZTEST Extended	8-minute water sprays every hour during the day with 3-minute water sprays every 15 minutes at night

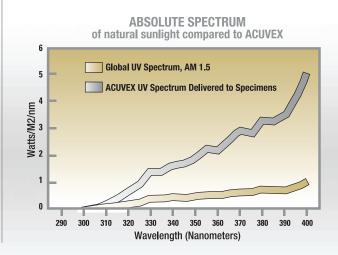
*As listed in ASTM G90

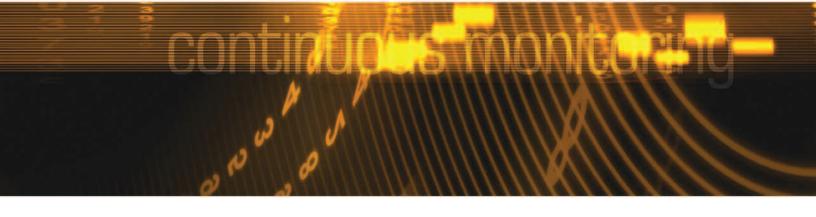
ACUVEX NATURAL SUNLIGHT

The graph depicts the relative spectrum of natural sunlight compared to ACUVEX. When contrasted with other accelerated weathering test methods, ACUVEX—which complies with ASTM G90—provides the closest match to natural sunlight in ultraviolet terms.



This graph portrays the absolute spectrum of natural sunlight compared to ACUVEX. With the ACUVEX unit, radiation intensity at the specimen surface is much greater than with natural sunlight exposure—providing faster tests.







HOW ACUVEX® CONTROLS AND CAPTURES DATA

Each ACUVEX tracker in the exposure field contains a dedicated onboard computer to control all operation phases, powered by a DC power supply with battery backup. Totally automatic, trackers safely shut down

during power outages until power returns. Each tracker's computer receives input from solar cells and turns on motors to automatically keep

specimens in focus during the day. Other automatic functions include controlling water sprays, switching tracking on and off, and continuously monitoring machine operation.

At AZTEST, our ACUVEX trackers, field weather station, and office computers are connected via a dedicated network. Emergency conditions are reported to office computers, facilitating fast repairs to minimize downtime. Conditions recorded at each test machine are archived to provide a history of exposure conditions. Each ACUVEX tracker has a black and white panel thermometer (as shown at left) mounted in the specimen area alongside test specimens. These are used to monitor machine operations and record exposure-test history.

HOW ACUVEX SUPPORTS DIVERSE TESTING REQUIREMENTS

Specimens generally are flat with a maximum dimension of 15 cm, (6 in), along one edge. A typical specimen size is 7.5 x 13 cm (3 x 5 in). However, many sizes can be accommodated as long as one dimension does not exceed 15 cm (6 in). Specimens larger than 15 cm (6 in) can often be accommodated with special mounting.

Specimen thickness is usually 3 mm (1/8 in) or less, but thicker specimens can be accommodated with special mounting. Specimens are mounted unbacked, which allows both front and back surfaces to be cooled; however, backed mounting can be used to provide higher specimen temperatures.



HOW TO ESTIMATE TEST TIME AND COST

Each product's testing is as unique as its profile—to best estimate cost and duration of a specific ACUVEX test exposure, go to:

www.aztest.com/acucal

This online calculator will provide a close assessment of your requirements as shown below:





ASTM D5722/ SOAK-FREEZE-THAW TESTING

To test pre-finished hardboard and simulate Midwestern US climates, ASTM Committee D01.52 developed test procedure ASTM D5722, "Performing Accelerated Outdoor Weathering of Factory-Coated Embossed Hardboard Using Concentrated Natural Sunlight and a Soak-Freeze-Thaw Procedure."



Testing subjects samples to a series of daily soak-freeze-thaw cycles that include:

- 1. Daily exposure using ASTM G90 Cycle 1
- 2. A one-hour soak using de-ionized water
- 3. A 12-hour freeze at or near -18° C (0° F)
- 4. A one-hour thaw under ambient conditions

The cycle pattern was chosen because of its good correlation to field failures in climates with freeze-thaw cycles.

TEST STANDARDS

ACUVEX COMPLIES WITH THE FOLLOWING NATIONAL AND INTERNATIONAL TEST STANDARDS:

> ASTM G90 ASTM D4364 ASTM D5722 ASTM D4141 SAE J1961 ISO 877

Contact AZTEST Customer Service at wsales@aztest.com for more information on how AZTEST can meet your specific test requirements.



AZTEST Enclosures for Automotive Interior Materials provide vital data and real-world results for interior weathering performance. Automotive interior materials can reach soaring temperatures—exceeding 110° C (230° F) on a summer day in Arizona. Heat and the altered light spectrum from window glass, significantly affects interiors. Add in time, and the effects are both measurable and dramatic.

AZTEST's accelerated weathering test cabinets simulate vehicle interiors and are adjusted to create specific conditions to analyze product performance. AZTEST offers approximately 300 test cabinets ideally suited for evaluating the weatherability of automotive interior materials. In addition, AZTEST is the solar-exposure laboratory for GM interior validation testing and meets automotive standards that include GMW3417, GM2617M, and FORD DVM0020.

HOW AZTEST ENCLOSURES WORK

Enclosures are sealed, under-glass test fixtures designed with temperature-limiting fans to control the maximum black panel temperature. Black-panel temperature is regulated by a black sensor, which continuously monitors temperatures. As sunlight enters the enclosure, the temperatures of both the cabinet and specimens rise. If the preset temperature is exceeded, recirculating fans automatically cool the interior. Temperatures generally are set in a range from 85° C to 110° C.





HOW AZTEST® ENCLOSURES WORK—continued

Standard test cabinets placed on sun-tracking mounts follow the sun in azimuth (rotation) to accelerate the weathering process. Enclosures generally are set at a fixed tilt angle (usually 51 degrees from the horizontal) and tracked as they follow the sun in azimuth. This approach provides more solar radiation and faster tests compared to fixed-angle exposures. Plus, azimuth tracking reduces test times without compromising test accuracy—representing a fast and economical alternative to xenon-arc weathering tests.

TEMPERATURE-NORMALIZED RADIATION

AZTEST deploys a unique methodology to normalize solar radiant exposure based on temperature. As the sensors measure internal temperatures, TNR (Temperature Normalized Radiation) is calculated with the following equation:

TNR =
$$\sum_{\text{start}}^{\text{end}} \mathbf{R}^* e$$
 (13.643-[5000/(T+273.15)])

This technique minimizes differences for tests run at different times of the year. For a detailed description of this equation, go to www.aztest.com.









HOW AZTEST ENCLOSURES SUPPORT DIVERSE TESTING REQUIREMENTS

Two types of specimens are evaluated in the test enclosures—small, flat automotive interior trim specimens and full-size automotive interior parts, including instrument panels, door panels, fabrics, leather, seat cushions, package trays, seat belts, and steering wheels.

All specimens are mounted to within 50 to 100 mm (2 in to 4 in) from the glass cover. To test in accordance with GMW 3417 and GM9538P, the glass covers are either clear tempered or clear laminated, depending on the test component's location in the vehicle.

automatic sensors

ADVANCED FEATURES

Every enclosure in the test field is monitored by dedicated onboard computers that control all phases of operation. Each is powered by a DC power supply. Totally automatic, enclosures safely shut down during power outages until power returns. Each enclosure computer receives input from solar cells and turns on motors to automatically keep specimens in focus during the day. Other automatic functions include maintaining blackpanel temperatures, switching tracking on and off, and continuously monitoring machine operation.

The AZTEST® enclosures, field weather station, and office computers are connected via a dedicated network. Emergency conditions are reported to office computers, facilitating fast repairs to minimize downtime. Conditions recorded at each test machine are archived to provide a history of exposure conditions.



HOW TO MEET AUTOMOTIVE VALIDATION STANDARDS

AZTEST is the Solar Exposure Laboratory for performing testing in accordance with GMW 3417 and GM 9538P. For these applications, test enclosures are configured as follows:

- Follow-the-sun operation in azimuth with a fixed altitude tilt angle of 51°
- Circulating fans that switch on when black panel temperature reaches 85°C, 93°C, 102°C, or 110°C, depending on the parts type and location in a vehicle
- Exposure timing based on TNR Langleys (Temperature Normalized Radiation)
- Clear laminated or clear tempered glass cover



TYPICAL TEST TIMES FOR SELECTED INTERIOR PARTS (based on GM 2617M)



PART	REQUIREMENT	TYPICAL TEST DURATION
Instrument Panel	100,000 TNR Langleys at 102°C	4.5 to 7 months
Door Panel Upper / Armrest	50,000 TNR Langleys at 85°C	4 to 6 months
Door Panel Vertical	5,000 TNR Langleys at 85°C	less than one month
Console (horizontal portion)	30,000 TNR Langleys at 93°C	2 to 3 months
Overhead Parts	10,000 TNR Langleys at 85°C	1 to 1.5 months





ACCELERATED AZTEST MIRRORED ENCLOSURES

AZTEST® offers Mirrored Enclosures for further acceleration. Developed by personnel at GM's Desert Proving Grounds, mirrored enclosures offer significantly faster acceleration over standard enclosures.

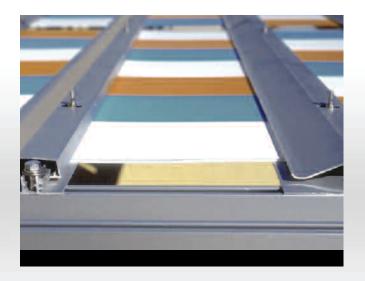
This technique allows specimens to accumulate TNR Langleys or MJ/m² nearly two times faster than normal azimuth tracking enclosures. Because of the additional light energy provided to specimens, these enclosures typically are operated only at black-panel temperatures greater than or equal to 102°C. Results on these enclosures are generally accepted by GM for hard plastics.

Contact AZTEST Customer Service at wsales@aztest.com for more information on how AZTEST can meet your specific test requirements.



Natural Outdoor Weathering

AZTEST's desert location offers excellent opportunities for natural weathering evaluations. Extremely hot and dry, the Arizona environment is the standard climatic measurement for any outdoor weathering needs. Natural weathering is the only true benchmark for weathering tests. Although very good, accelerated tests can never exactly simulate reactions to real outdoor settings with their inherent climatic changes. Natural weathering not only tests environmental effects, but also respects environmental integrity—using far less electricity than artificial weathering.



NATURAL WEATHERING STANDARDS

Our testing procedures meet numerous requirements for outdoor weathering, including these industry standards: ASTM G7, G24, D 1435, D 4141, SAE J576, SAE J1976, GM 9163P, GMW 14873, Ford B1-160, and ISO 877. Outdoor exposure tests are typically performed on aluminum exposure racks capable of handling specimens of various dimensions.

OUTCOOR weathering

TYPES OF NATURAL WEATHERING

Direct Weathering

Direct weathering exposes specimens directly to the elements. Specimens are mounted on aluminum exposure racks capable of handling various dimensions and evaluated per industry standards. Factors that affect exposure findings include specimen backing, orientation and test duration.

Under Glass Weathering

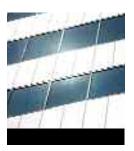
Under glass weathering specimens are mounted under or behind glass. Specimens usually are samples of test materials used inside a building or automobile. Test materials are exposed in cabinets, which protects them from rainfall while letting sunlight pass through a sheet of glass. The glass filters the sunlight, removing (at a minimum) shorter ultraviolet wavelengths in solar radiation. Enclosures are either well-ventilated or sealed, depending on customer requirements. Some of the factors that affect exposure findings include glass type, specimen backing, orientation, and test duration.



Backing has a direct effect upon material temperature. The common backing types are:

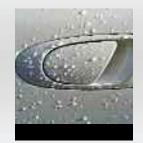
BACKING TYPE	TYPICAL USE
UNBACKED	Coil coatings, sign material, automotive
BACKED	Siding, roofing, building products, automotive
EXPANDED METAL	Automotive
BLACK BOX	Automotive











Dacking direct exposure under glass

EXPOSURE ANGLES

Specimens can be exposed at any angle facing south. The following table lists the most common exposure angles used in weathering tests:

ANGLE*	TYPICAL APPLICATION
5°	Most automotive specifications
34°	Same as site latitude: generally the most accumulated radiant exposure in a typical year among the common exposure angles
45°	Most popular exposure angle
90°	Siding and other materials used at vertical orientation
Variable 14° – 34° – 54°	Maximizes radiant exposure with four angle changes per year with an overall increase over 34° of about 15 %

^{*} Measured from the horizontal, facing south

EXPOSURE DURATION

The duration of weathering is based on elapsed time (days, weeks, months, or years), or based on accumulated radiant exposure—either total (all wavelengths) or ultraviolet. Periodic inspections, measurements and/or returns are recommended.

FLORIDA WEATHERING

AZTEST can arrange for exposure tests in Florida and other locations. Contact wsales@aztest for more information.







lements climate environment

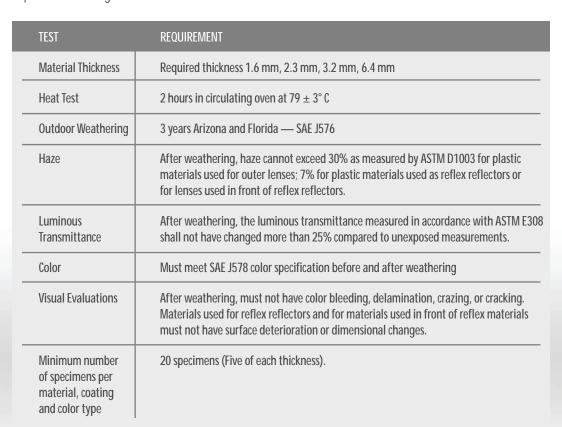
SAE J 576 TESTING

AZTEST provides SAE J576 compliant testing services to meet automotive plastic lens material requirements as required by the Federal Motor Vehicle Safety Standard No. 571.108.

SAE J576 also allows accelerated testing in accordance with ASTM D 4364. This standard is based on ASTM Standard G 90, "Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight."

Accelerated and Natural Arizona and Florida Weathering tests are available, including all the required instrumental measurement and visual evaluations.

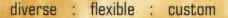
Federal Motor Vehicle Safety Standard No. 571.108, Lamps, Reflective Devices, and Associated Equipment requires the following tests:







As an A2LA and AMECA accredited lab, AZTEST can perform all weathering tests required by AMECA and SAE specifications related to automotive lighting lens materials.





AZTEST

complete service suite

Recognizing the diversity of customer testing goals, AZTEST is pleased to offer testing and evaluation services that span numerous color measurement requirements, visual inspection data, and special project objectives.

COLOR AND GLOSS MEASUREMENTS

AZTEST performs color measurements using a Hunterlab Ultrascan XE spectrophotometer. This instrument features:

- Dual beam optics
- Integrating sphere
- Pulsed Xenon light source
- Capability to measure transparent, translucent, and opaque materials
- Small area (6 mm 1/4 inch) optional view area
- Improved accuracy and repeatability
- Integrated color measurement software

Typically, color measurements are first performed prior to exposure and then re-assessed after weathering exposure to determine color change. AZTEST can perform color measurements with any common illuminant scale and observer, as well as report measurements using standard scales, including XYZ, CIE Lab, and Hunter Lab. Color measurements also can be performed using portable X-Rite spectrophotometers.

In addition, AZTEST performs gloss measurements using Byk-Gardner and Hunterlab gloss meters with available geometries of 20°, 60° and 85°.

INSPECTIONS

AZTEST visual inspections are performed in accordance with ASTM and ISO standards. The following criteria (if appropriate) can be included in inspection reports:

- General Appearance
- Erosion
- Checking/Cracking
- Dirt Retention
- Chalking (ASTM and ISO)
- Flaking/Scaling

Blistering

Digital photography is available as part of AZTEST inspection services.

SPECIAL PROJECTS

AZTEST is well-versed in conducting special projects that include the following:

- Temperature measurements
- Custom facility design such as:
 - Test Cabinets
 - Solar Simulators
 - Accelerated Weathering Facilities
 - Conventional Test Racks
- · Driving evaluations
- Software development



AZTEST clients have the option of password-protected Internet access to their test data through our secure Web site. Clients can perform the following operations:

- Get current "real-time" program status
- View results from color gloss and visual inspection evaluations
- View scanned documents
- View digital start and end of test photographs
- Reset passwords

Client confidentiality of data is protected through our SSL (secure socket layer) Web site and password-protected system.



ISO 17025 Accreditation

Testing Certificate # 1507.01

AZTEST's Wittmann location is fully accredited by A2LA (American Association for Laboratory Accreditation) to ISO Guide 17025 (Certificate # 1507.01). For a copy of our A2LA Scope of Accreditation, go to www.aztest.com. AZTEST also is accredited by AMECA, the Automotive Manufacturers Equipment Compliance Agency for testing automotive lighting to FMVSS 571.108 and SAE J576.



How To Order

Contact AZTEST Customer Service at wsales@aztest.com for more information on how AZTEST can meet your specific test requirements. The sales team will provide guidance on how to create a test, ship your samples and set parameters to evaluate products.

TO CREATE AN ORDER:

- Go to www.aztest.com
- Click on "Download" at the top of the home page
- Select "Order Forms" from the drop down menu
- Select order form format
- Complete and submit to wsales@aztest.com

GUIDELINES FOR ORDERING, PACKING AND SHIPPING*:

From US locations—

- Carefully package test samples for shipment
- Non-fabric specimens should be wrapped in a soft paper product (we recommend Kimtech Kimwipes Delicate Task Wipers)
- Do not use newspaper
- Wrap entire package in bubble wrap and secure with tape
- Place package in sturdy box or container and fill gaps with packing material

From international locations—

- Follow US location packaging instructions above
- Complete a Commercial Invoice to accompany samples
- Assign a \$1.00 value on shipping documents (we recommend sample description as follows: "Test Samples. No Commercial Value")

*INSTRUCTIONS ALSO AVAILABLE AT www.AZTEST.com

SEND PACKAGED SPECIMENS, ORDER FORM (**OPIIONAL**) AND PURCHASE ORDER TO:

Arizona Desert Testing LLC

21212 West Patton Road Wittmann, Arizona 85361 USA

To contact AZTEST:

call: +1-623-388-9500 fax: +1-623-388-9007 e-mail: wsales@aztest.com visit: www.aztest.com

write: 21212 West Patton Road Wittmann, Arizona 85361 USA







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21212 West Patton Road Wittmann, Arizona 85361 USA

+1-623-388-9500 +1-623-388-9007 fax wsales@aztest.com

www.aztest.com



Q-Lab Test Services

- ▶ Florida & Arizona Outdoor Exposures
- Accelerated Laboratory Testing
- ▶ Evaluations



Weathering & Outdoor Climatic Testing

If you're concerned about your product's appearance or functional performance in the outdoor environment, you're not alone. Sunlight, heat, and moisture cause billions of dollars in product damage every year. A proper weathering testing program can help you anticipate and prevent a variety of potential product failures, meet durability specifications, and preserve your reputation for quality.

Will your product last outdoors? Don't guess when you can test!



WHY TEST?

Reliable weathering and corrosion data can help you:

- > Avoid unexpected product failures
- > Make the best material selection decisions
- > Validate new or less-expensive materials or additives
- > Improve your competitive advantage
- > Warranty your product's lifetime with confidence

Natural outdoor weathering and corrosion testing give the most realistic prediction of product performance. Accelerated testing, available both outdoors and in the laboratory, gives faster results but with some uncertainty about its accuracy. Many companies combine both approaches to ensure reliable results in the shortest time possible.

WHY CHOOSE Q-LAB?

Experienced and Reliable

Q-Lab provides the highest-quality weathering testing services. Our first natural weathering site opened in 1959. Today, our scientists and engineers participate and offer leadership in ISO, ASTM, IEC, GB, and numerous other professional organizations in creating standardized test methods and procedures.

Instant Credibility

When Q-Lab does your testing, the results have instant credibility with your customers and colleagues. Q-Lab conducts all exposure tests and evaluations in accordance with appropriate test methods from ASTM, ISO, BSI, DIN, JIS, SAE, GB, and other recognized organizations and is accredited by AMECA and AAMA.

Cost-Effective

Q-Lab's state-of-the-art test services are available at a surprisingly affordable price. In many cases, it is less costly to test with Q-Lab than to set up and run tests yourself.

Best Test Sites, Best Technology

South Florida and Arizona, where Q-Lab does most of its outdoor testing, have been recognized for over a century as harsh climates for product testing. If your products perform well in these benchmark locations, they will perform well just about anywhere. Q-Lab uses the most trusted accelerated weathering and corrosion technologies, used by thousands of companies in dozens of industries.



Natural Outdoor Testing

Location is everything. About one hundred years ago, companies in the paint and automotive industries realized that environmental conditions in South Florida and the Arizona desert were the harshest on their products. Several companies operated their own test sites in these locations, and they used what they learned to make their products durable enough to ensure generations of satisfied customers. Today, much of this testing has been consolidated at Q-Lab's sites in Florida and Arizona. Companies around the globe trust Q-Lab to perform their outdoor product testing.

FLORIDA

The subtropical climate of the Miami area has the perfect year-round combination of abundant sunlight, warm temperatures, and plentiful water. Sunshine during the summer months in Miami is quite similar to that of northern temperate regions. However, in the winter the difference is dramatic. The key point is that it is the same sun—just more of it, and for a longer duration each year. The same holds true for temperature, rainfall, dew, and humidity.

The result of this perfect combination of environmental factors is that exposures at Q-Lab Florida are accelerated compared to temperate climates. One year of Florida sunshine can produce the same weathering effects on materials as several years of weathering in most major markets around the world. Specimens that can withstand the sunlight, heat, and water in south Florida can be expected to be durable in most locations around the world.

SOUTH FLORIDA IS PERFECT FOR TESTING:

- > Sunlight (UV) stability
- > Moisture sensitivity
- > Mildew/mold resistance
- > Surface erosion
- > High-temperature resistance
- > Thermal shock response
- > Corrosion behavior
- > Moisture ingress
- > Acid rain resistance





ARIZONA

Arizona's desert climate is characterized by intense sunlight, very high temperatures, minimal rainfall, and very low humidity. Arizona desert exposures provide a different – in some ways harsher – exposure environment than Florida subtropical tests. Compared with Florida, Arizona is much hotter and receives about 15-20% more annual total solar and UV energy. Arizona experiences large day to night temperature variations, about 17 °C (31 °F) on average. Arizona receives little annual rainfall and has low atmospheric moisture overall. Specimens tested in the Arizona desert can be expected to have superior resistance to sunshine and elevated temperatures.

ARIZONA DESERT IS PERFECT FOR TESTING:

- Sunlight (UV) stability
- Heat aging effects
- > Thermal expansion stress resistance
- > Heat deflection and distortion
- > Material durability in low humidity environments

OHIO

Northeast Ohio has a Northern Temperate climate, meaning it experiences four true seasons during the year. Outdoor specimens are subject to a range of exposures to UV light, temperature, and water, including regular freeze/thaw cycles during the winter.

Although Northeast Ohio testing will generally not attain the acceleration of natural outdoor testing in Florida or Arizona, it does deliver conditions experienced by much of the population of the United States and the rest of the world.

Some industries include a benchmark Northern Temperate climate in their certification programs, in addition to Florida and Arizona, to ensure a fully comprehensive program for natural weathering. Ohio is ideal for meeting these requirements.







Accelerated Laboratory Testing

Q-Lab offers a full range of accelerated laboratory weathering and corrosion testing services at our fully-equipped facilities in Florida and Germany. Q-Lab can perform most testing that utilizes xenon arc, fluorescent UV, salt spray, or cyclic corrosion chambers. Contract testing at Q-Lab is an ideal solution for companies that:

- Have a short-term need for testing but aren't ready to invest in facilities and equipment
- Need additional testing capacity that the in-house lab can't accommodate
- Have a special project with a new test cycle that can't be performed in-house
- Need third-party verification of test results

STANDARD & CUSTOM EXPOSURES

Tests and evaluations are performed to appropriate ASTM, ISO, EN, DIN, JIS, SAE, GB, AATCC, or other standard procedures.

Visit **Q-Lab.com/standards** or contact Q-Lab to discuss a particular standard.

We can also perform custom exposures to meet your individual testing needs. More on page 13.

TWO LABS, ONE STANDARD OF QUALITY

- Homestead, Florida USA
- Saarbrücken, Germany

Both locations follow the ISO 17025 accredited Quality System, ensuring the best care for your projects.



Homestead, Florida USA



Saarbrücken, Germany



TYPES OF ACCELERATED TESTS



XENON ARC WEATHERING

For weathering tests that require full sunlight simulation, the **Q-SUN** xenon arc weathering chamber can perform a variety of methods from the automotive, textile, building material, paint, plastics, personal care, or other industries. Xenon arc instruments are usually the best choice for applications where color change is the primary failure mode of concern.



FLUORESCENT UV WEATHERING

When changes to physical properties of polymeric materials are the concern, the **QUV** accelerated weathering tester is an effective tool for comparative testing. Fluorescent UV lamps match the most damaging portion of the sunlight spectrum (UVA and UVB), reproduce degradation from germidical treatments (UVC), or simulate indoor environments (Cool White).



SALT SPRAY/ **CYCLIC CORROSION**

Q-FOG cyclic corrosion chambers can perform any test from simple salt spray to tests with precise control of RH and moisture transitions, which is required by most OEM automotive standards. In addition, certain models can also perform demanding modern test protocols like CASS and JASO M609.



Q-TRAC Natural Sunlight Concentrator Testing

Faster test, natural environment. Accelerated outdoor materials testing using a Q-TRAC natural sunlight concentrator delivers the benefits of testing in a natural outdoor environment while at the same time amplifying the sunlight and heat delivered to specimens. This testing is especially useful for highly-durable materials with long expected lifetimes.

SUPER-FAST RESULTS FROM NATURAL SUNLIGHT

The Q-TRAC delivers the same amount of damaging ultraviolet energy in just one year as specimens would experience in five years of Florida sunlight. Like other accelerated tests, sunlight concentrator testing allows products to be brought to market faster, but the Q-TRAC uses natural sunlight to reduce further the risk of generating erroneous test results. In this way, the Q-TRAC delivers dual benefits – the realism of natural exposures and the speed of accelerated laboratory tests.

Q-TRAC IS PERFECT FOR TESTING:

- > Roofing
- > Coil coatings
- > Fluoropolymers
- > Geosynthetics
- > Powder coatings
- > Building materials
- > Industrial coatings
- > Hardboard coatings



ENHANCED SUNLIGHT WITH CONCENTRATING MIRRORS

The Q-TRAC system uses an array of 10 flat mirrors to reflect and concentrate natural sunlight onto the test specimens. It further maximizes the exposure by automatically tracking the sun throughout the day in both azimuth (horizontal) and elevation (vertical).

Sunlight to Mirrors Cooling Duct Test Samples **Sunlight to Mirrors** Mirror Bed

Q-TRAC WATER SPRAY & SPECIAL APPLICATIONS

Water spray during the night time can simulate the time of wetness experienced in Florida, and during the day it can simulate thermal shock associated with rain bursts. During night-time wetting, specimens are oriented facing upward to give increased wetness and realism compared to original natural sunlight concentrator testing. Q-Lab also offers temperature-controlled Q-TRAC testing for more heat-sensitive specimens.

Several standardized cycles—including desert, freeze/thaw, and spray are available to test different materials and end-use application. Standards include:

- ASTM G90
- **ASTM D4141**
- **ASTM D4364**
- **ASTM D5105**
- **ASTM D5722**
- **SAE J1961**
- **SAE J576**
- ISO 877-3
- AAMA 623, 624 and 625







Automotive Interior Testing

Accelerated testing to simulate behind-glass environments. Interior components in automobiles and other behind-glass environments can experience higher temperatures than materials in service outdoors. AIM box testing delivers high temperatures in combination with natural sunlight behind window glass for fast, realistic testing.

AIM BOX

An Automotive Interior Materials (AIM) box is an under-glass enclosure that simulates the sunlight and heat found inside an automobile. Although this technology was developed for the automotive industry, it can be very effective for many applications where glass-filtered sunlight and heat are important stressors, such as building window assemblies and electrical enclosures.

Key test standards for AIM box testing include GMW 14873, GMW 16717, GMW 3417, GM 2617M, GM 3619M, GM 7454M, GM 7455M, GM 9538P, Ford DVM 0020, and ASTM G201.

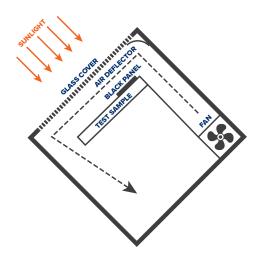
DEGRADATION MODES PRODUCED IN AIM BOX TESTING:

- Color change
- Cracking
- Peeling
- Oxidation
- Heat deflection
- **Tackiness**

REALISTIC SIMULATION

Testing automotive interiors can be different from testing other materials because air temperatures inside a vehicle can far exceed the temperature outside it. Materials can reach 100 °C or more in warmer climates. Furthermore, the light that reaches internal components is filtered by automotive glass, making it different from natural outdoor sunlight.

The AIM box uses tempered glass - clear or laminated - to simulate the sunlight spectrum experienced inside a car. In addition, a black panel thermometer continuously monitors the environment inside the box. A cooling fan and curtain are used to ensure that specimens are maintained at precise and realistic temperatures.





ACCELERATION

The AIM box in Arizona can perform precision azimuth tracking of the sun throughout the day. This boosts the total amount of solar radiation reaching the specimens for faster results without sacrificing accuracy.

TRUE AIM BOX

To increase the total amount of solar radiation exposure, Q-Lab's proprietary new TRUE (Tracking Reflecting Ultra Exposure) AIM box uses highly reflective mirrors and dual-axis tracking (azimuth and elevation) to focus more sunlight into the box interior. This technique approximately doubles the total sunlight received every day.





Standard Outdoor Exposures

True benchmarking via standardized testing. Natural outdoor testing according to international test standards gives improved consistency of results from test to test. Having a library of outdoor test data according to recognized test standards gives the best estimate for a product's service life and serves as an excellent basis for comparison to accelerated laboratory testing.

DIRECT EXPOSURE (ASTM G7, ASTM D1435)

Specimens can be securely mounted at a variety of angles for direct exposure to the sun. Various backing techniques are available to simulate the thermal environment of the specimen's intended service application. Plywood backing raises temperatures, while open- or mesh-backed specimens receive maximum natural air flow for cooler temperatures.



UNDER GLASS (ASTM G24, ISO 877-2)

These exposures are used to test interior-use materials, such as textiles and printing inks. Specimens are behind 3 mm window glass which will filter out short-wavelength (UVB) light. Exposures are typically at a 45° or 5° angle from horizontal.



BLACK BOX (ASTM D4141, GMW 14873)

These tests reproduce conditions found on the horizontal surfaces of a vehicle, including higher temperatures and longer wet times. Under glass black box exposures are used to test automotive interior materials or other applications that experience similar conditions.

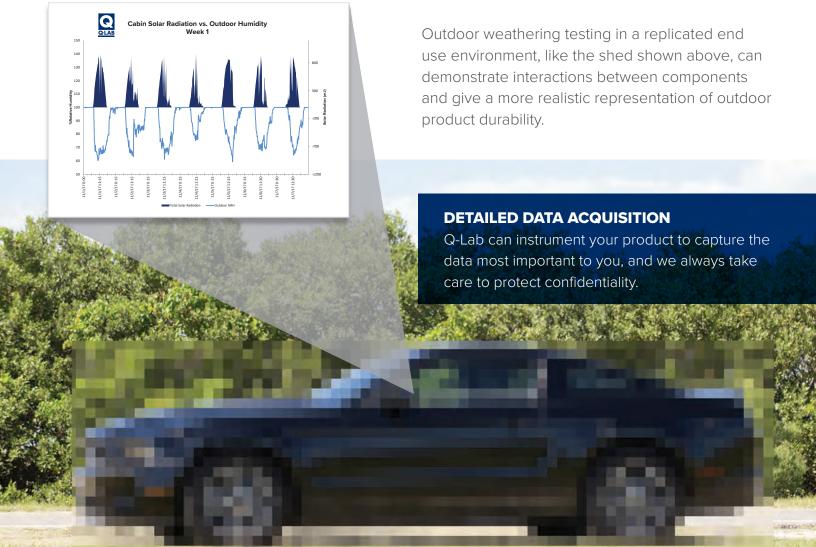


Other standard outdoor exposure test methods are available, including salt-accelerated, outdoor acid etch, and mildew-enhanced weathering.

Custom Tests & Special Projects

If you need a specialized test for a component, assembly, or complete product, Q-Lab can customize a test program to identify any problem areas quickly. Do you need to measure the temperature profile of multiple areas of your product throughout the day? Or design a test that accurately simulates your product's end use? Whatever your need, our experts can design a customized test solution to fit your budget.







Evaluations & Physical Testing

Exposing your products or materials is only half of the equation. Measuring how they degrade over time is the other half. Q-Lab's engineers and technicians are worldwide experts at identifying and quantifying how your materials change when exposed to weathering or corrosion tests. We have many tools at our disposal to tell you nearly everything you need to know about your product's performance.

VISUAL EVALUATIONS

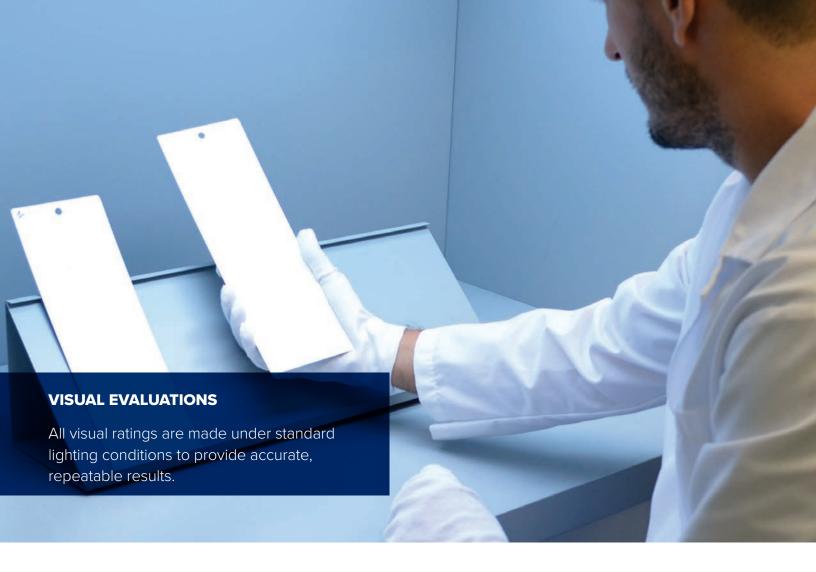
Visual evaluations detail all defects observed, such as cracking/checking, blistering, chalking, dirt retention, flaking, mildew growth, surface rust, or color change, according to standardized rating scales.

Q-Lab technicians are highly trained and experienced experts in the field of evaluation techniques and reporting scales. Many are actively involved in the organizations that create and maintain the standards relied upon by labs around the world.

COLOR & GLOSS MEASUREMENTS

Instrumental measurements of appearance and surface characteristics include gloss, distinctness of image, and color. These are used in place of or in addition to visual ratings, and are required by many standards. The science of color and appearance measurement can be very complex, and Q-Lab's experts can guide you through your options to ensure you get the correct data for your needs.





MECHANICAL TESTS

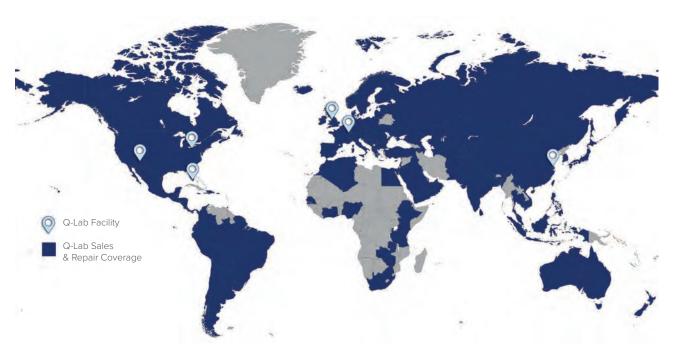
Mechanical tests on physical properties are necessary for many products and materials. They include:

- Drop impact
- Pencil hardness
- Tape adhesion
- Mandrel bend & elongation

- Tensile strength & elongation
- > Shear & peel adhesion
- Gravelometer stone chip impact
- Taber abrasion

PHOTOGRAPHY & SPECIAL HANDLING

A complete test program often includes other special services or handling. Common services include washing, polishing, scribing, and specimen weighing. Q-Lab can also photograph weathering and corrosion changes, which requires special lighting skills and equipment.





OUR GLOBAL NETWORK

We are committed to provide world-class technical, sales, and repair support in each of the over 60 countries in which we operate. Visit **Q-Lab.com/support** for contact information specific to your location and inquiry type.

GLOBAL HEADQUARTERS

WESTLAKE, OH USA info@q-lab.com +1-440-835-8700

Q-LAB CHINA

SHANGHAI, CHINA info.cn@q-lab.com +86-21-5879-7970

Q-LAB EUROPE, LTD.

BOLTON, ENGLAND info.eu@q-lab.com +44-1204-861616

Q-LAB FLORIDA

HOMESTEAD, FL USA testing@q-lab.com +1-305-245-5600

Q-LAB DEUTSCHLAND GMBH

SAARBRÜCKEN, GERMANY info.de@q-lab.com +49-681-857470

Q-LAB ARIZONA

BUCKEYE, AZ USA testing@q-lab.com +1-623-386-5140