

**AUTOMOTIVE
ENVIRONMENTAL TEST
MATRIX**



Test	Method	Substrate	Test Duration	Standard	Actual
Accelerated Weathering - Filiform	2014	Cast Aluminum Wheel	28 days	Chrysler	Pass
Accelerated Weathering - Filiform	J 1960	Cast Aluminum Wheel	800 hours	Ford	Pass
Accelerated Weathering - Filiform	GM 9682P	Cast Aluminum Wheel	1500 hours	GM	Pass
Armor All Resistance	LP463PB-34-01,	Cast Aluminum Wheel	24 hour drop test	Chrysler	Pass
Boiling Water	HES 3.2	Cast Aluminum Wheel	100C, 3 hours	Chrysler	Pass
Brake Fluid Resistance	LP463PB-34-01,	Cast Aluminum Wheel	24 hour drop test	Chrysler	Pass
CASS	GM4472P	Cast Aluminum Wheel	168 hours	GM	Pass
CASS	1001	Cast Aluminum Wheel	240 Hours	Toyota	Pass
Chemical Resistance - Acid	1002	Panel	24 hours	Toyota	Pass
Chemical Resistance - Alkali	1002	Panel	4 hous @ 55C	Toyota	Pass
Chemical Resistance - Gasoline Immersion	1006	Panel	7 hours @ 23C	Toyota	Pass
Chemical Resistance - Water	1002	Panel	4 hours @ 55C	Toyota	Pass
Chemical Resistance Solvent	1002	Panel	3 hours @ 23C	Toyota	Pass
Chemical Resistance Sulfurous Acid	1002	Panel	24 hours @24C	Toyota	Pass
Chip Resistance	GM 9508P	Cast Aluminum Wheel	8	GM	GM 6, Pass
Cleaner Resistance	1020	Panel	1 hour	Toyota	Pass
Crosshatch Adhesion	4002, ASTM D3359-97	Cast Aluminum Wheel	1 hour, 5B	Toyota,	Pass
Engine Oil Resistance	LP463PB-34-01,	Cast Aluminum Wheel	24 hour drop test	Chrysler	Pass
Florida Exposure	LP463PB-34-01, 82-04-05	Cast Aluminum Wheel	3 Years	GM, Chrysler, Ford	Minimal degradation
Gasoline Resistance	LP463PB-34-01,	Cast Aluminum Wheel	10-Dip	Chrysler	Pass
Gloss	ASTM D 1729/523	Panel	60 degree angle	Toyota	>100
Gravelometer and 66 hours CASS		Cast Aluminum Wheel		Toyota	Pass
Gravelometer, Room Temperature	SAE J400	Cast Aluminum Wheel		GM	Pass
Gravelometer, Sub-zero	SAE J400	Cast Aluminum Wheel		GM	Pass
Hardness	4011	Panel	1 hour	Toyota	"H" Pencil
Hot Water	HES 3.3	Cast Aluminum Wheel	40C, 240 hours	Toyota	Slight Haze, Good Adhesion
Hot Water Immersion - 40C	2018, GM 9017P	Cast Aluminum Wheel	240 hours	Toyota, GM	Pass
Hot Water Immersion - 60C	2018, GM 4465P	Cast Aluminum Wheel	240 hours	Toyota, GM	Pass

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Goodrich Technology Corp

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Test	Method	Substrate	Test Duration	Standard	Actual
Humidity Exposure	ASTM D3359	Panel	96 Hours	Chrysler	Pass
Hydrochloric Acid	HES 5.9.3	Panel	85C, 15 Min.	Toyota	Pass
Reverse Saw Adhesion and Hammer		Cast Aluminum Wheel			Pass
Salt Fog Corrosion	ASTM B117-97	Cast Aluminum Wheel	<1/16 Creep	Toyota	Pass
Salt spray	GMASTM B-117	Cast Aluminum Wheel	1000 Hours	GM	Pass
Salt spray	1001	Cast Aluminum Wheel	1000 Hours	Toyota	Pass
Sodium Hydroxide	HES 5.9.4	Panel	55C, 4hours	Toyota	Pass
Stone Chip	GM9508P	Panel		GM	Pass
Sulfuric Acid	HES 5.8	Panel	25C, 7 hours	Toyota	Pass
Sulfuric Acid	HES 5.9.2	Panel	25C, 24 hours	Toyota	Pass
Taber Abrasion	GM 9515	Cast Aluminum Wheel	60 Cycles	GM	5 mg loss
Thermal Cycle	2001	Cast Aluminum Wheel	40 hours	Toyota	Pass
Thermal Shock	FLTM B1 107-05	Cast Aluminum Wheel		Ford	Pass
Thermal Shock	GM9525P,	Cast Aluminum Wheel		GM	Pass
Water Immersion 96hrs	ASTM D3359	Panel	96 Hours	Chrysler	Pass
Water Spot	HES 5.9.1	Cast Aluminum Wheel	55C, 4hours	Toyota	Pass
Weight Decrease(*)		Cast Aluminum Wheel	At least 70% less than cladding, 89% less than chrome	Chrysler	0.28lbs on 10 spoke 16X6.5 alloy wheel
Xenon Test	SAE J1960	Cast Aluminum Wheel	3311 Hours,4171 kJ	Chrysler	Pass
Note: All tests have been performed on Aluminum Automotive Wheels to paint specifications unless noted otherwise. The majority of the tests have been performed with a scribe mark to base metal.					
(*)Weight Decrease	The weight of an average 16" automotive wheel can be increased as much as 2.5 lbs. per wheel with traditional chrome. As an average the PermaStar Chrome finish as about 1/4 lbs. per wheel.				