HBC system

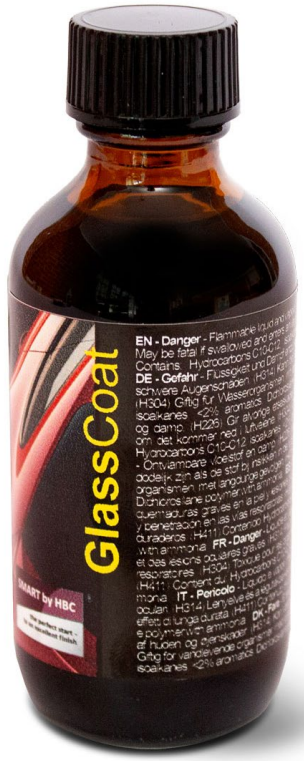
GlassCoat

EASY TO APPLY PAINT PROTECTION

Efficacy Test and Report

Test: **Durability of Glasscoat using an Accelerated Weather test.**

The Product : HBC System Glasscoat (Part no. 570)



GlassCoat protects paint finishes against damage from machine car washes, environmental conditions for up to a 7 year period! GlassCoat is a ceramic glass resin, that when applied to your paint provides a permanent bond that protects and guarantees your vehicle's finish from environmental conditions not covered by the manufacturer's warranty.

GlassCoat is a clear liquid that is applied to the clearcoat of your vehicle. Unlike traditional waxes and sealants that simply "coat the surface", GlassCoat polymerizes and crosslinks onto the surface of the clear-coat. The end result is a clear and extremely durable ceramic film that adheres so strongly to the surface that not even organic solvents can remove it.

The Test:
To determine the durability of Glasscoat using an Accelerated Weather test, SAE Test J2527-2004, which prescribes wavelength distribution, irradiance, humidity, exposure, and water spray cycles.

The Test Lab
Atlas Material Testing, Chicago, IL

The Test Result:
Glasscoat showed no failure after 1750 hours of weatherometer testing ... the equivalent of 7+ years.

Accelerated Weather Test Comparing HBC System - Glasscoat to Seven Other Products

September 2015

Bolton, Conneticut

Summary

An accelerated weather test was chosen to compare weather resistance of nine products: (1) Glasscoat, (2) Auto Armor Cleaner/Renewer, (3) PermaPlate Paintguard, (4) Xzilon Orange (foil package), (5) Xzilon Green (foil pkg.), (6) Xzilon Green (bottle), (7) Cilajet PS, (8) EcoCar Pro. Results were as follows:

Product	Hours to Failure	Mid-Atlantic Avg. Weather
Glasscoat (1)	no failure at 1750	over 7 years
Auto Armor (2)	500 - 750	2 – 3 years
PermaPlate Paintguard (3)	less than 250	less than 1 year
Xzilon Orange (4)	750	3 years
Xzilon Green (5)	approx. 500	approx. 2 years
Xzilon Green (bottle) (6)	n/a	n/a
Cilajet PS (7)	750	3 years
EcoCar Pro (8)	approx. 500	approx. 2 years

Introduction

The effects of weather—ultraviolet light and water condensation/evaporation—represent a constant threat to the longevity of an automotive paint sealant (PS), and is a significant factor in the long-term degradation/removal of PS from the surface of a treated vehicle. Seven PS products were chosen for evaluation. Test panels were prepared and sent to Atlas Materials Testing of Chicago, IL, which is the oldest and largest manufacturer of weather test equipment. To test PS products against the effects of weather, an accelerated weather cabinet, or Weatherometer, is used. The current exposure standard for such a test is the Society of Automotive Engineers' Standard SAE J2527-2004, which prescribes wavelength distribution, irradiance, humidity, exposure, and water spray cycles. Although manufacturers of Weatherometers and authors of the official exposure test standards refuse to equate hours in the cabinet with months of exposure to average weather conditions, it is understood within the automotive coatings industry that 500 hours in the cabinet is approximately equal to two years' coastal weather at 30-50 degrees North Latitude (mid-Atlantic).

The test was run for a total of 2000 hours. Between 1750 and 2000, the UV destroyed the base coat/clearcoat substrate and the panels chalked over. Product performance could only be tested through 1750 hours.

Weatherometer Exposure	Average Weather Exposure
250 hrs.	1 year
500 hrs.	2 years
750 hrs.	3 years
1000 hrs.	4 years
1500 hrs.	6 years

Methodology: Since PS products deliver a thin, invisible coating to the base coat/clearcoat substrate, it isn't visually evident if the coating is fresh, degraded, or absent. The active ingredients of a PS product are commonly selected to be hydrophobic, and differences in Water Repellence can be detected visually. Degradation of the PS coating can be reliably inferred from reduction in water repellence. However, pure water has a high surface tension, which causes it to "bead" well on hard smooth surfaces like an automotive base coat/clearcoat. If the surface tension is slightly reduced, the liquid beads nicely on a highly hydrophobic surface (such as PS) in small circular beads. If the liquid is gently misted onto an uncoated substrate, the water forms large amoeba-shaped beads which combine to form larger amoeba-shaped beads. Approximately 30 mL liquid is used. Test panels were coated half with a PS product, half uncoated, and submitted to Atlas for exposure. They were returned for evaluation, and sent back to Atlas for additional exposure. Two products, Permaplate Paintguard and Xzilon Green (bottle), exhibited such poor water repellence at initial application, that their performance was difficult or impossible to document.

The Uncoated left side is easily distinguished from the Coated right side. The coating is Auto Armor.

Results and Discussion

Glasscoat:
Water repellence at 1750 hours was indistinguishable from that at initial application. In the first photograph (fig. 1), considerably more than the usual 30mL was misted onto the panel, and the beads on the coated surface simply would not coalesce.

The coating's hydrophobic character forced the excess Spray Solution to the uncoated half or off the edge. The close-up photo (fig. 2) indicates that the liquid beads still retain their circular base.

Fig. 1 Glasscoat 1750 hours

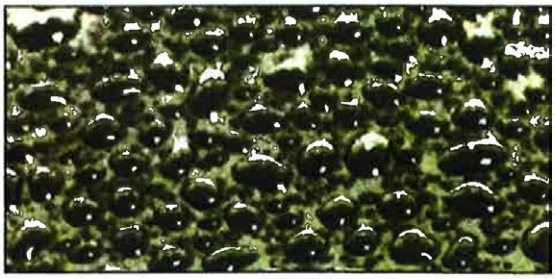


Fig. 2 Glasscoat 1750 hours (detail)

Auto Armor Cleaner Renewer:
Water repellence at 250 hours was clearly evident (fig. 3). The beads themselves have begun to take on an amoeba-shaped base (fig. 4). At 500 hours, the distinction between Uncoated/Coated halves is evident (fig. 5), but the beads are highly irregular (fig. 6). At 750 hours, the distinction between Uncoated and Coated halves has disappeared (fig. 7), and the beads' base shapes have become random (fig. 8).

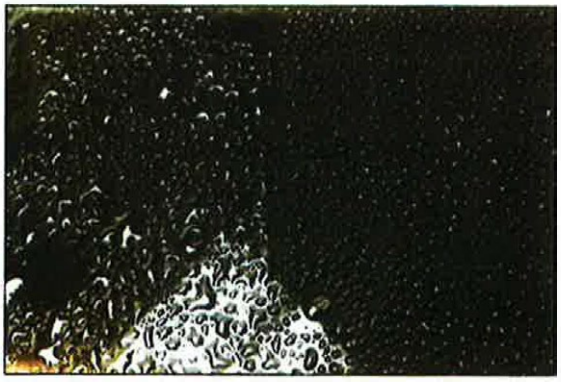


Fig. 3 Auto Armor at 250 hrs

Fig. 4 Auto Armor at 250 hrs (detail)

Results and Discussion *Continued*

Fig. 5 Auto Armor at 500 hours

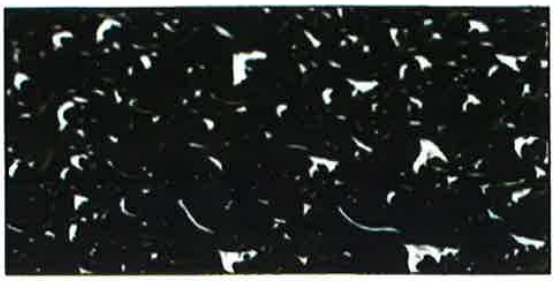


Fig. 6 Auto Armor at 500 hours (detail)

Fig. 7 Auto Armor at 750 hours

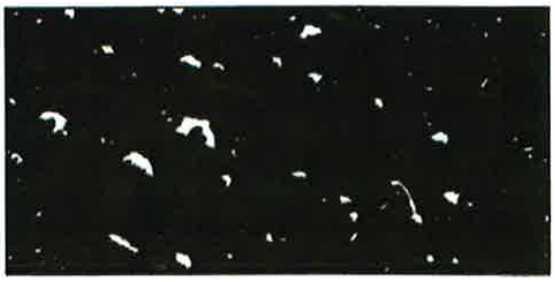


Fig. 8 Auto Armor at 750 hours

PermaPlate Paintguard:

Water repellence at initial application was so poor that it was impossible to distinguish the Coated half of the panel from the Uncoated half (the left half in the photo) (fig. 9). It was possible to discern a difference in the rate at which water flows off the panel when tipped. Figure 10 shows water has flowed off the coated half, while about a quarter of the initial volume on the uncoated half remains in the instant that the picture was snapped. At 250 hours, it was impossible to discern a difference in water-shed rate between the two halves.

Fig. 9 PermaPlate Paintguard 0 hours

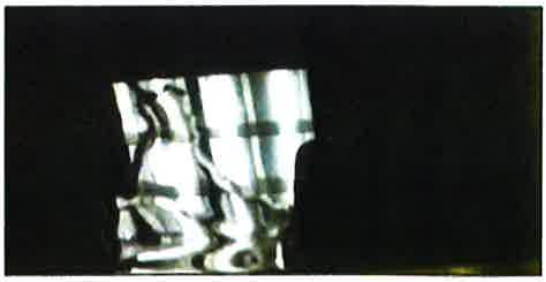


Fig. 10 Water sheds slightly faster from the Coated half]

Results and Discussion *Continued*

Cilajet:

Water repellence at 500 hours was quite good, as indicated by the clear difference between Uncoated and Coated halves (fig. 11). In the photo, Spray Solution has coalesced into large drops on the uncoated half. In the closeup (fig. 12), the drops are only slightly irregular. By 750 hours, the distinction between the two halves was nearly gone (fig. 13).

There was in fact a visual difference between the Uncoated and Coated halves, but it affected the way light was reflecting, not in the shape or size of the beads, and couldn't be caught in a photograph. At 1000 hours, even that perceptible difference had disappeared.

Fig. 11 Cilajet at 500 hours

Fig. 12 Cilajet at 500 hours (detail)

Fig. 13 Cilajet at 750 hours

Results and Discussion *Continued*

Xzilon Green (foil pkg.):
Water repellence at 250 hours (fig. 14) was sufficient to distinguish between the coated and uncoated halves of the panel. At 500 hours, there is no perceptible difference (fig. 15), and the beads of Spray Solution are irregular in shape (fig. 16).

Fig. 14 Xzilon Green at 250 hours

Fig. 15 Xzilon Green at 500 hours

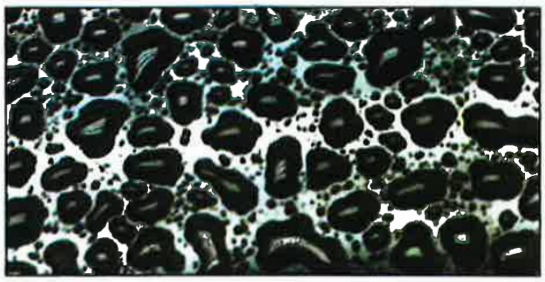


Fig. 16 Xzilon Green at 500 hours (detail)

Xzilon Green (aluminum bottle):
Like the PermaPlate Paintguard, Xzilon Green (bottle) exhibited extremely poor water repellence as to make it indistinguishable from the uncoated half. We tried multiple coats, different drying times, misting on a bit of distilled water to encourage molecular cross-linking (if possible), different panels—all to no avail. The panel in figure 17 (hole-side Uncoated) was submitted nevertheless to see if differences might appear. They did not.

Fig. 17 Xzilon Green (bottle) initial application. The right half of the panel is the coated half.

Results and Discussion *Continued*

Xzilon Green (foil pkg.):
Water repellence at 250 hours (fig. 14) was sufficient to distinguish between the coated and uncoated halves of the panel. At 500 hours, there is no perceptible difference (fig. 15), and the beads of Spray Solution are irregular in shape (fig. 16).

Fig. 15 Xzilon Green at 500 hours

Fig. 14 Xzilon Green at 250 hours

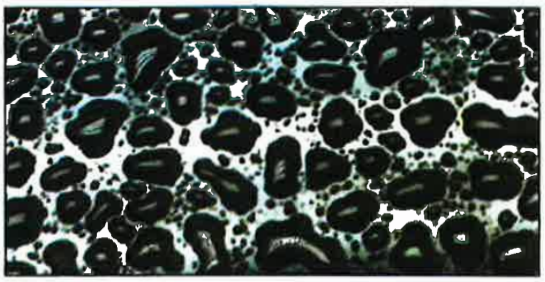


Fig. 16 Xzilon Green at 500 hours (detail)

Xzilon Green (aluminum bottle):
Like the PermaPlate Paintguard, Xzilon Green (bottle) exhibited extremely poor water repellence as to make it indistinguishable from the uncoated half. We tried multiple coats, different drying times, misting on a bit of distilled water to encourage molecular cross-linking (if possible), different panels—all to no avail. The panel in figure 17 (hole-side Uncoated) was submitted nevertheless to see if differences might appear. They did not.

Fig. 17 Xzilon Green (bottle) initial application. The right half of the panel is the coated half.

Page 6

Results and Discussion *Continued*

Xzilon Orange (foil pkg.):
Water repellence at 250 hours (fig. 18) and at 500 hours (fig. 19) is sufficient to clearly distinguish the uncoated and coated halves. At 750 hours, water repellence of the coated half had degraded to the point that it was impossible to distinguish coated from uncoated (fig. 20).

Fig. 18 Xzilon Orange at 250 hours

Fig. 19 Xzilon Orange at 500 hours

Fig. 20 Xzilon Orange at 750 hours

EcoCar Pro:
Water repellence of the coated half at 250 hours is sufficient to distinguish it from the uncoated, and the beads of spray solution are very small but slightly amoeba-shaped. (fig. 21). By 500 hours, the coated and uncoated halves cannot be distinguished, and the beads on the coated side are irregularly shaped (fig. 22).

Fig. 21 EcoCar Pro at 250 hours

Fig. 22 EcoCar Pro at 500 hours

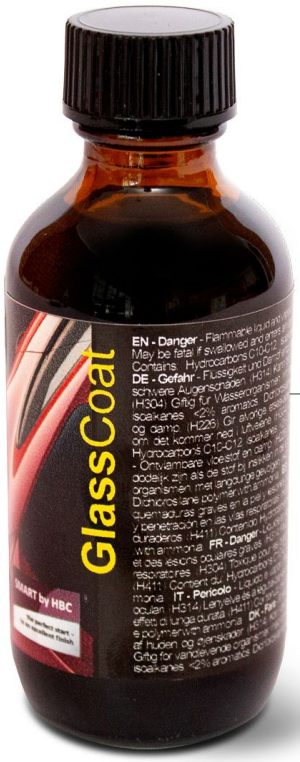
Conclusion

Product	Longevity in Avg. Weather Conditions
GlassCoat	7 years +
Cilajet Xzilon	3 years
Orange Auto	3 years
Armor	2-3 years
EcoCar Pro	2 years
Xzilon Green	1-2 years
PermaPlate Paintguard	1 year

Products are listed in order of performance. At 1750 hours, the GlassCoat panel was identical to its condition at initial application. The Cilajet PS and Xzilon Orange product performances were practically identical, with little or no distinction between Coated and Uncoated sides at 750 hours. Spray Solution was misted on the panels in various quantities from 30-60 grams of solution in an attempt to coax differences to appear at least to the observer, if not to the camera. At 1000 hours, those "subjective differences" had disappeared. Those coatings were mostly or all gone at 750 hours. The Auto Armor product appeared to have completely vanished by 750 hours, but was clearly present but "going" at 500, as judged by the amoeba-shaped beads of Spray Solution in fig. 6. The two ecology-conscious products, EcoCar Pro and Xzilon Green (foil package), performed below the non-ecology products. The solids content of EcoCar Pro is 2.5%, which suggests the product to be at least 97% water. At initial application, the beads of Spray Solution were slightly irregular in shape (which seems to bode ill for long-term performance) but very small, so there can be no doubt that EcoCar Pro's active ingredients (probably silicone in a micro emulsion) are hydrophobic. The product physically resembles a standard silicone spray & wipe. Xzilon Green (foil package) exhibited poor water repellence as judged by amoeba-shaped beads of Spray Solution visible at initial application. The product was clearly present at 250 hours, but it was also clearly "going." Failure was easily diagnosed as having happened between 250 and 500 hours. PermaPlate Paintguard presented a problem—extremely poor water repellence on initial application—as did Xzilon Green in the bottle. There was no evidence (as judged by water repellence) that either product was on its panel after 250 hours in the test cabinet.

Test: **Assess if two coats of GlassCoat can prevent the cracking /chipping of a vehicles paint when dings occur.**

The Product : HBC System Glasscoat (Part no. 570)



GlassCoat protects the painted surface of the vehicle when minor dings occur. The coat is designed to enhance customer loyalty, protect the investment of customers' vehicles and create an additional revenue stream that increases profitability for body shops.

The Test:
A car door 11ding" test to determine if two coats of GlassCoat could prevent the cracking and chipping of a vehicles paint when dings occur. An eleven (11) pound cylinder with a hemispherical end was dropped from one meter above the door to produce a representative door ding.

The Test Lab
Cascade Tek
Hillsboro, OR

The Test Result: The dropped cylinder produced a golf ball sized ding approximately 1.5 inches in diameter. HBC GlassCoat protected the paint with chipping or cracks and only light abrasions. These light abrasions were easily buffed out with traditional detail methods .

CASCADE™ TEK

TEST REPORT

CTC 7723-1

April 8, 2016

ACCREDITED
Accredited by American Association for Laboratory Accreditation (A2LA) 2562.01 & 2562.02

ista CERTIFIED LABORATORY
Certified Commercial Package Testing Laboratory (ISTA)

MIL-STD Laboratory Suitability Status by Defense Logistics Agency (DLA)

LABORATORY LOCATIONS

OREGON
5245-A NE Elam Young Pkwy.
Hillsboro, OR, 97124 • Ph: 503-648-1818

COLORADO
1530 Vista View Drive
Longmont, CO, 80504 • Ph: 720-340-7810

www.cascadetek.com

Job Number: 7723

Rev.	Description of the Revision	Date
---	Initial Release of the Data Report.	April 8, 2016

Test Title	Test Summary
Car Door Ding Test	The test was conducted per the required standard with no deviations.

CASCADE TEK
Cascade Technical Sciences
www.cascadetek.com
1-888-835-9250

TESTING CERT #2582.01

April 8, 2016

Certification No: CTC 7723-1

Reference:		
	Cascade Tek Job No.:	7723
	Cascade Tek Quote No.:	CTQ 17868
	Technical Specification:	Customer SOW

Cascade Technical Sciences hereby certifies that GlassCoat Paint Sealant was applied to the test object and then subjected to the following test:

1. Car Door Ding Test per Reference (b) Item 2 and (d2), the customer supplied coating was applied to an automotive door per customer instruction. A spherical shaped object was dropped onto the door to produce a 1-2 inch indentation in the painted door surface.

Testing was done in accordance with the above references as evidenced and reported in the accompanying data. The test sample was returned to the customer for evaluation.

Cascade Technical Sciences
www.cascadetek.com
1-888-835-9250

TESTING CERT #2582.01

April 8, 2016

Certification No: CTC 7723-1

The original of this report is on file at Cascade Technical Sciences, Inc. under the above referenced certification number for review by authorized personnel. The results of the testing reported herein relate only to the actual item tested.

Respectfully submitted,

David Bowles
Quality Administrator
Cascade Technical Sciences, Inc.

The objective of this test program was to subject customer provided test hardware to environmental simulation in compliance with customer stated specification, including any authorized modification, deviations or concessions to the original requirements. The hardware consisted of items identified in the appropriate sections of this report. In addition to test hardware identification, each section contains information that describes the associated test setup and performance and the resulting data. Cascade TEK, Inc. measuring instruments used in testing were calibrated according to the requirements of ANSI/NCSL Z540-1-1944 and ISO/IEC 17025, 2nd Edition and are NIST traceable. Calibration records are on file and available for inspection by request. Because the test methods are well established and are qualitative or semi-quantitative in nature, Cascade TEK, Inc. does not apply measurement uncertainty unless obligated by contract. Measured value related to the corresponding tolerance requirement is used to decide whether a test meets the requirements of the specification. Any test hardware operational setups and resulting evaluations or inspections performed by the customer are not included in this report, unless they were explicitly requested. While observations and/or specification compliance statements may be reported, no interpretations or opinions regarding customer product performance are intended. Unless otherwise indicated in the appropriate report section, all contract obligations were met and the test objective achieved.

CASCADE TEK

Test Data Log

Section 1 – Job Information

Job Number: 7723

Date Started: 12/2/2015
Date Completed: 12/2/2015

QA Reviewer: Larry Harmon
Signature: Larry Harmon

Responsible Technician: Brandon Payne
Quote Issued By: Chris Ingebritsen

Customer Witness: No ☒ Yes ☐ Name:

Section 2 – Test Parameters

Test Title: Car Door Ding Test

Test Specification: Customer Statement of Work.

Test Description: Customer coating to be applied to the door per customer instruction. A spherical shaped object shall be dropped onto the door to produce a 1-2 inch indentation in the painted door surface.

Section 3 – Test Sample Information

Sample Description	Sample P/N or Model No.	Sample S/N or Other Identifier	Qty.
GlassCoat paint sealant	GlassCoat		1

Section 4 – Test Equipment

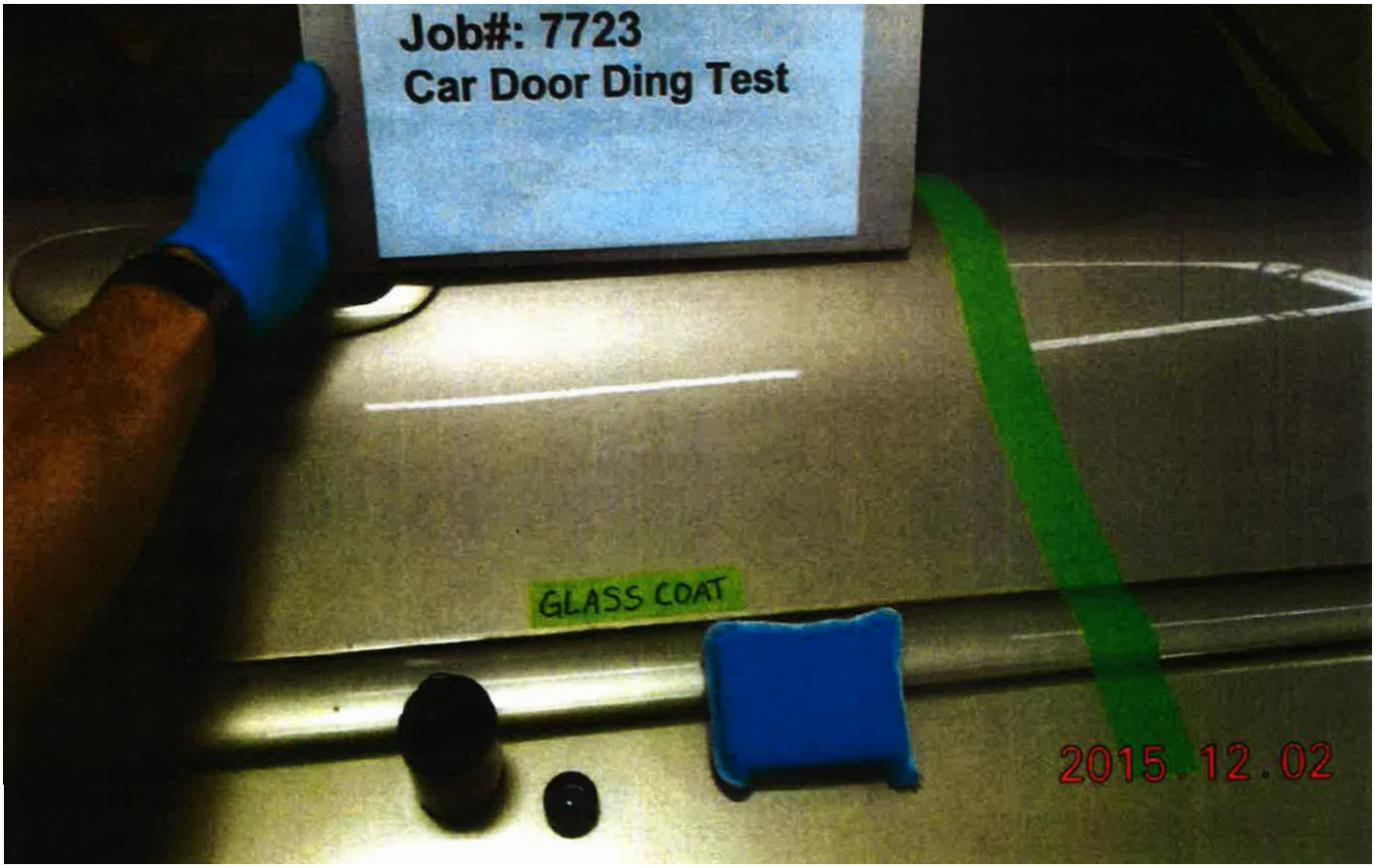
ID No.	Description	Manufacturer	Model No.	Serial No.	Last Cal	Next Cal
408	Lab Ambient Temp/Hum	Extech	445703	CP94594	12/20/2014	12/31/2016
N/A	Ruler	Empire	S4	N/A	Verified Before Use	
1284	Drop Tester	LAB	AD160A	291246	Reference Only	
—	11 lb. Weight	Custom	—	—	Verified Before Use	

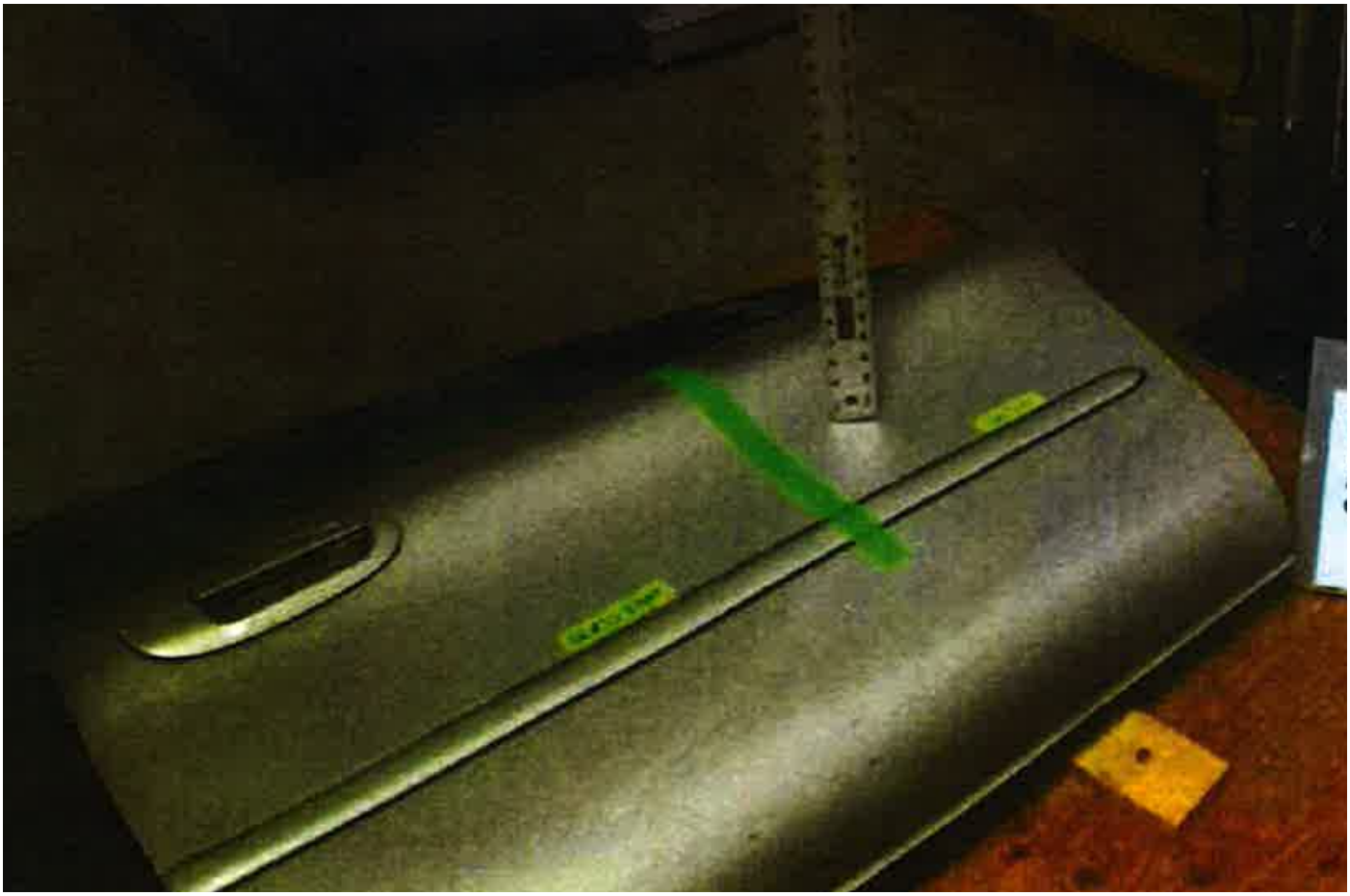
Section 5 – Test Log

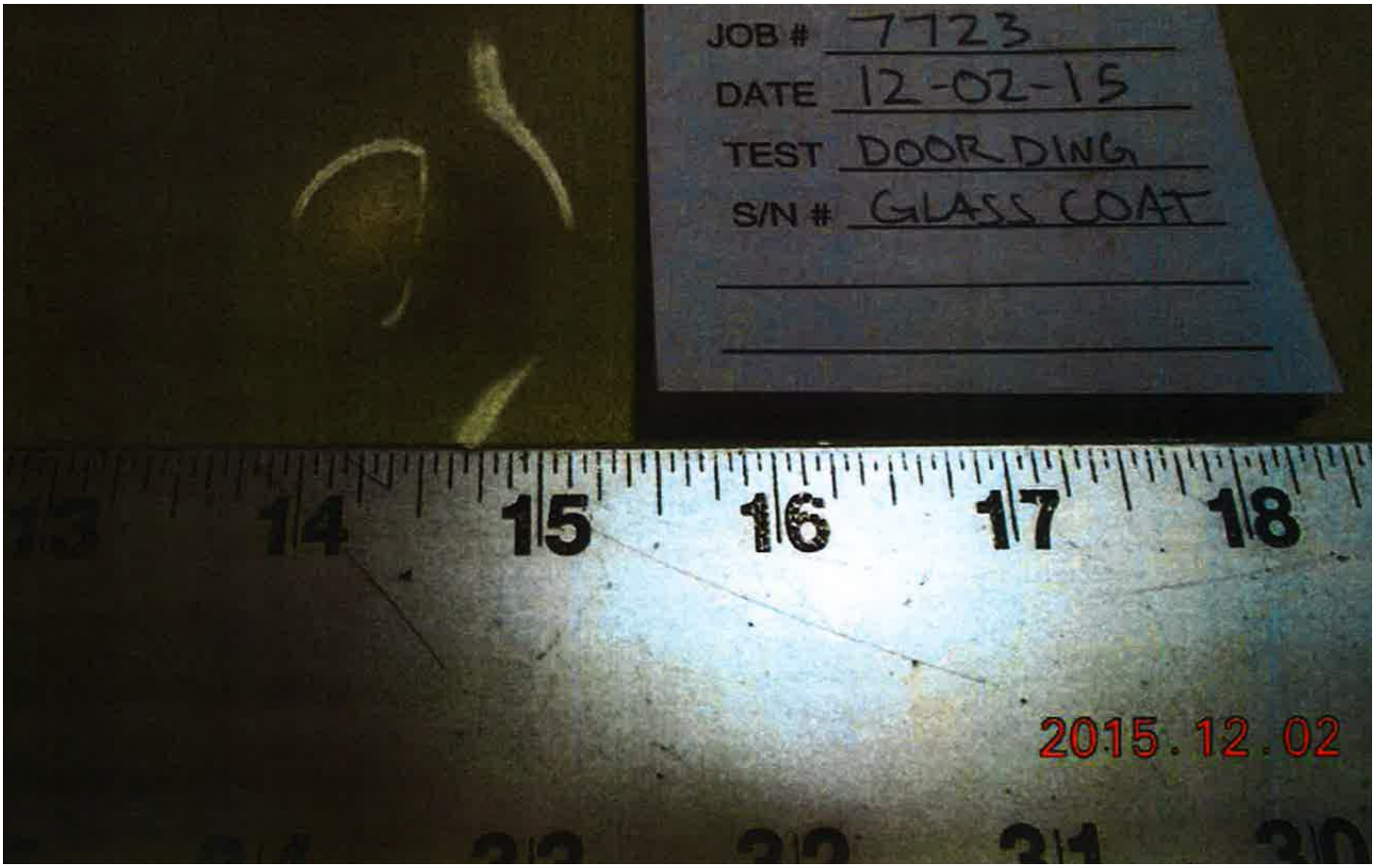
Laboratory Temperature: 73°F

Job Number: 7723 Laboratory Humidity: 27%RH

Initials	Date	Time	Notes	Photo
BP	12/2/2015	0903	Begin setup of car door for first application of GlassCoat product. Painted door surface has been cleaned with alcohol and paper towels to remove any possible wax or coating left behind.	☐
BP	12/2/2015	0915	Glasscoat applied with supplied applicator and allowed to dry for five minutes before buffing with customer supplied microfiber cloth. The first application of GlassCoat is complete. Second application will begin 30 minutes after first application.	☒
BP	12/2/2015	0950	Second application of Glasscoat is complete. Begin setup of door under drop apparatus for door ding test.	☒
BP	812/2/2015	0954	The setup is complete with 11 lb. cylinder, with a hemispherical end, to be dropped from one meter above door to produce representative door ding. Begin Drop.	☒
BP	12/2/2015	0959	Drop complete. Door ding photographed with light abrasion noted. Photos taken and stored for customer evaluation.	☒
			Test Complete	


Job#: 7723
Car Door Ding Test
GLASS COAT
2015.12.02




JOB # 7723
DATE 12-02-15
TEST DOOR DING
S/N # GLASS COAT
14
15
16
17
18
2015 . 12 . 02


CASCADE TEK
JOB #
DATE 12-02-
TEST DOOR DING
S/N # GLASS COAT
16
15
2015 . 12 . 02

More information: **www.hbc-system.com // +45 7022 7070**

HBC system©

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