

REPORT NUMBER 104-GTL-18-001

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 104 WINDSHIELD WIPING AND WASHING SYSTEMS

FORD MOTOR CO.
2018 FORD MUSTANG, PASSENGER CAR
NHTSA NO. C20180203

GENERAL TESTING LABORATORIES, INC.
1623 LEEDSTOWN ROAD
COLONIAL BEACH, VIRGINIA 22443



February 26, 2018

FINAL REPORT

PREPARED FOR

**U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVE., S.E.
WASHINGTON, D.C. 20590**

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SECTION 1

PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2018 FORD MUSTANG Passenger Car was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 104 testing to determine if the vehicle was in compliance with the requirements of the standard. All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedure, TP-104-08 dated 26 June 1996 and General Testing Laboratories, Inc. (GTL) Test Procedure, TP-104-08A dated 4 April 1997.

1.1 The test vehicle was a 2018 FORD MUSTANG Passenger Car. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: 1FA6P8TH5J5106332

B. NHTSA No.: C20180203

C. Manufacturer: FORD MOTOR CO.

D. Manufacture Date: 10/17

E. Color: Kona Blue Metallic

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 104 testing on February 15, 2018.

SECTION 2

COMPLIANCE TEST PROCEDURE AND SUMMARY OF RESULTS

2.0 GENERAL

The 2018 FORD MUSTANG passenger car, NHTSA No. C20180203 was subjected to FMVSS No. 104 tests on February 15, 2018. The selected portions of FMVSS No. 104 tests used were as amplified in the following subparagraphs. The test vehicle was positioned in the test system with three water spray nozzles suspended in line with the center of the longitudinal axis of the windshield and horizontal left/right center of the windshield to provide an even distribution of spray to the entire windshield. The height of the nozzles was approximately 22 inches above the glazing surface.

2.1 WIPER FREQUENCY TEST

The wiper frequency test was performed with the ICE (internal combustion engine) or in the case of an EV (electric vehicle) the electric propulsion system activated and with a minimum of 50 cubic inches per minute of water from the spray nozzles. The wiper frequency was measured at the low and high wiper speed settings with the propulsion system activated in its idle condition. In the case of ICE vehicles, the wiper frequency was also measured at the low and high wiper speed settings with the engine at 2000 RPM.

2.2 WIPE AREA TEST

The test was conducted with the windshield wiper system operating at the high speed setting, engine (ICE or EV) at idle RPM and the spray nozzles spraying water at a minimum of 50 cubic inches per minute. The wiper blade wipe pattern was outlined on the glazing surface and then transferred to a windshield pattern. The wiped area was determined for areas A, B and C from the windshield pattern.

2.3 WASHER CAPABILITY TEST

The windshield glazing surface was coated with a mixture of water and fine grade test dust. Within 15 seconds following application of the water-dust mixture, the windshield wiper and washing system was activated in the high speed mode for ten complete cycles. The vehicle's engine (ICE or EV) was operating at idle RPM. The cleared areas of the windshield were marked on the inside windshield surface. After ten complete cycles the system was deactivated and the wiped area transferred to a windshield pattern.

The glazing surface was cleaned and dried. The water dust mixture was re-applied and the test repeated.

The windshield patterns were used subsequently to determine the cleared area percentages.

SECTION 2 CONTINUED

COMPLIANCE TEST PROCEDURE AND SUMMARY OF RESULTS

2.4 SUMMARY OF RESULTS

Based on the test performed, the test vehicle's windshield wiping and washing system appears to meet the requirements of FMVSS 104.

SECTION 3

COMPLIANCE TEST DATA

3.0 TEST RESULTS

The following data sheets document the results of testing on the 2018 FORD MUSTANG Passenger Car.

SUMMARY OF DATA
FMVSS 104, WINDSHIELD WIPING AND WASHING SYSTEMS

VEH. MOD YR/MAKE/MODEL/BODY: 2018 FORD MUSTANG PASSENGER CAR
 VEH. NHTSA NO: C20180203; VIN: 1FA6P8TH5J5106332
 VEH. BUILD DATE: 10/17 TEST DATE: FEBRUARY 15, 2018
 TEST LABORATORY: GENERAL TESTING LABORATORIES
 OBSERVERS: GRANT FARRAND, JIMMY LATANE

WIPER TYPE: 2-SPEED ELECTRIC WITH DELAY

WASHER TYPE: HIGH PRESSURE ELECTRIC PUMP

WINDSHIELD AREAS: A = 1070 in² B = 739 in² C = 241 in²

MANUFACTURER'S WINDSHIELD PATTERN USED: Yes X No

ACCESSIBILITY:

(1) Washer Control Accessible: Yes X No
 (2) Wiper Control Accessible: Yes X No
 (3) Washer Reservoir Filler Accessible: Yes X No

DESCRIBE UNUSUAL FEATURES OF WIPING AND WASHING SYSTEMS:

PERFORMANCE:

TEST	PASS	FAIL
WIPER FREQUENCY	X	
WIPE AREA	X	
WASHER CAPABILITY	X	

RECORDED BY: G. FARRAND

DATE: 02/15/18

APPROVED BY: D. MESSICK

FREQUENCY TEST DATA
FMVSS 104 – WINDSHIELD WIPER SYSTEM

VEH. MOD YR/MAKE/MODEL/BODY: 2018 FORD MUSTANG PASSENGER CAR

VEH. NHTSA NO: C20180203; VIN: 1FA6P8TH5J5106332

VEH. BUILD DATE: 10/17 TEST DATE: FEBRUARY 15, 2018

TEST LABORATORY: GENERAL TESTING LABORATORIES

OBSERVERS: GRANT FARRAND, JIMMY LATANE

Water Hardness: 7.8 grains/gallon (12 max.); Date Certified: 02/15/18

Water Spray Flow Rate: 82 in³/min. (specified range = 50 to 100 in³/min.)

Ambient Air Temp.: 62 °F (50-100°F); Water Temp.: 50 °F (100°F max.)

Manufacturer's Recommended Engine Idle Speed: 900 rpm

RUN 1, MAXIMUM WIPER FREQUENCY TEST:

TIME	ENGINE SPEED	TOTAL CYCLES	AVG. CYCLES/MIN. (45 MINIMUM)
1 ST 3 minutes	<u>900</u> (idle ± 50 rpm)	243	81
2 ND 3 minutes	(2000 rpm ± 50 rpm)	251	84

Frequency at least 45 cycles/minute regardless of engine speed: Yes X No _____

RUN 2, LOWER WIPER FREQUENCY TEST:

TIME	ENGINE SPEED	TOTAL CYCLES	AVG. CYCLES/MIN. (20 MINIMUM)
1 ST 3 minutes	<u>900</u> (idle ± 50 rpm)	158	53
2 ND 3 minutes	(2000 rpm ± 50 rpm)	162	54

Highest and lower frequency differ by at least 15 cycles/minute, and lower frequency is at least 20 cycles/minute regardless of engine speed: Yes X No _____

REMARKS:

RECORDED BY: G. FARRAND

DATE: 02/15/18

APPROVED BY: D. MESSICK

WIPE AREA TEST DATA
FMVSS 104 – WINDSHIELD WIPER SYSTEM

VEH. MOD YR/MAKE/MODEL/BODY: 2018 FORD MUSTANG PASSENGER CAR

VEH. NHTSA NO: C20180203; VIN: 1FA6P8TH5J5106332

VEH. BUILD DATE: 10/17; TEST DATE: FEBRUARY 15, 2018

TEST LABORATORY: GENERAL TESTING LABORATORIES

OBSERVERS: GRANT FARRAND, JIMMY LATANE

Air Temperature in test area = 67 °F (specified range of 50 to 100°F)

Air Velocity at windshield = .1 mph (specified range of 0 to 1 mph)

Engine speed = 900 rpm (manufacturer's recommended idle $\pm$ 50 rpm)

Temperature of water spray = 50 °F (100° F maximum)

Water spray flow rate = 82 in³/min. (specified range of 50 to 100 in³/min.)

Windshield wiper frequency = 53 cycles/min. (45 cpm minimum)

TEST RESULTS:

PERCENT WIPED				
WINDSHIELD AREA	ACTUAL	REQUIRED	PASS	FAIL
A	99.1%	80%	X	
B	99.6%	94%	X	
C	100%	99%	X	

REMARKS:

RECORDED BY: G. FARRAND

DATE: 02/15/18

APPROVED BY: D. MESSICK

CAPABILITY TEST DATA
FMVSS 104 – WINDSHIELD WASHER SYSTEM

VEH. MOD YR/MAKE/MODEL/BODY: 2018 FORD MUSTANG PASSENGER CAR
 VEH. NHTSA NO: C20180203; VIN: 1FA6P8TH5J5106332
 VEH. BUILD DATE: 10/17; TEST DATE: FEBRUARY 15, 2018
 TEST LABORATORY: GENERAL TESTING LABORATORIES
 OBSERVERS: GRANT FARRAND, JIMMY LATANE

Air Temperature in test area = 70 °F (specified range of 70 to 80°F)

Washer reservoir fluid temperature = 75 °F (specified range of 70 to 80°F)

Air Velocity at windshield = .1 mph (specified range of 0 to 1 mph)

Engine speed = 900 rpm (manufacturer's recommended idle $\pm$ 50 rpm)

Number of windshield washer nozzles on the vehicle = 2 (3 Spray orifices on each)

Windshield washer system activation coordinated with components of the wiper system:

Yes X No

TEST RESULTS:

CLEARED AREA PERCENTAGES						
WINDSHIELD AREA	TEST 1	TEST 2	AVG	REQ'D*	PASS	FAIL
A	99.3	99.3	99.3	75%	X	
B	99.6	99.6	99.6	75%	X	
C	100	100	100	75%	X	

*NOTE FOR REFERENCE ONLY: SAE 942b, revised Jul72, recommends capability to clear 80% of the total wash area and 90% of the wash area included in AREA C.

REMARKS:

RECORDED BY: G. FARRAND
 APPROVED BY: D. MESSICK

DATE: 02/15/18

SECTION 4 INSTRUMENTATION AND EQUIPMENT LIST

TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
TIMER	ACCU-SPLIT	ACT2	03/17	03/18
TEMPERATURE READOUT	OMEGA	43P136P	03/17	03/19
SPRAY SYSTEM	GTL	N/A	BEFORE USE	BEFORE USE
ANEMOMETER	OMEGA	HH-600	04/17	04/19
CYCLE COUNTER	GTL	GTL	BEFORE USE	BEFORE USE
SOFT WATER	N/A	N/A	BEFORE USE	BEFORE USE
TEST DUST	AC	GM FINE	CALIBRATED DUST	CALIBRATED BY VENDOR*

*AC Inspection #503, Batch #1943, Measured with particle size roller analyzer.

SECTION 5
PHOTOGRAPHS



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.1
LEFT SIDE VIEW OF VEHICLE



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.2
RIGHT SIDE VIEW OF VEHICLE



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.3
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.4
¾ REAR VIEW FROM RIGHT SIDE VIEW OF VEHICLE

MFD. BY FORD MOTOR CO.

DATE: 10/17 GVWR: 2050 KG (4520 LB)
 FRONT GAWR: 1016 KG (2240 LB) REAR GAWR: 1061 KG (2340 LB)
 THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR
 VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS
 IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

VIN: 1FA6P8TH5J5106332 TYPE: Passenger Car
 MAXIMUM LOAD = OCCUPANTS + LUGGAGE = 303KG/ 668LB
 OCCUPANTS = 4 TOTAL; 2 FRONT, 2 REAR

TIRE (FR): 255/40ZR19 96W RIMS (FR): 19x8.5J
 (RR): 255/40ZR19 96W (RR): 19x8.5J
 PRESSURE (FR): 220 kPa/ 32 PSI COLD (RR): 220 kPa/ 32 PSI COLD


1FA6P8TH5J5106332

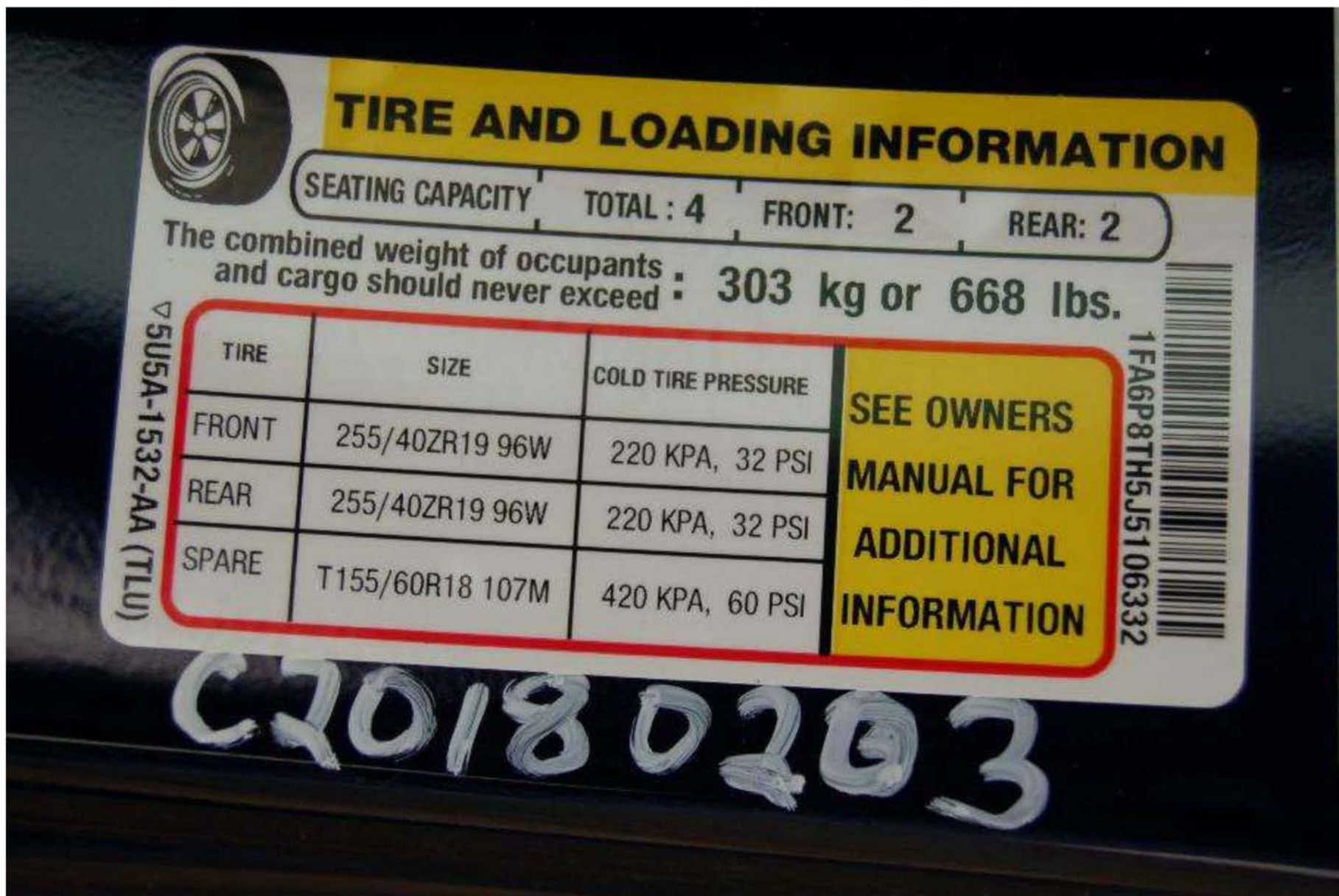
TRAILER TOWING - SEE OWNER GUIDE

EXT PNT: L6	IRC: 16	DSO:	F0123
INT TR	TP/PS	R	AXLE
51	2	GG	X
		44BB	

1201710193255 CMC ▽5U5A-5420472-AA

2018 FORD MUSTANG
 NHTSA NO. C20180203
 FMVSS NO. 104

FIGURE 5.5
 VEHICLE CERTIFICATION LABEL



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.6
VEHICLE TIRE INFORMATION LABEL



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.7
INSTRUMENTATION AND EQUIPMENT SET-UP



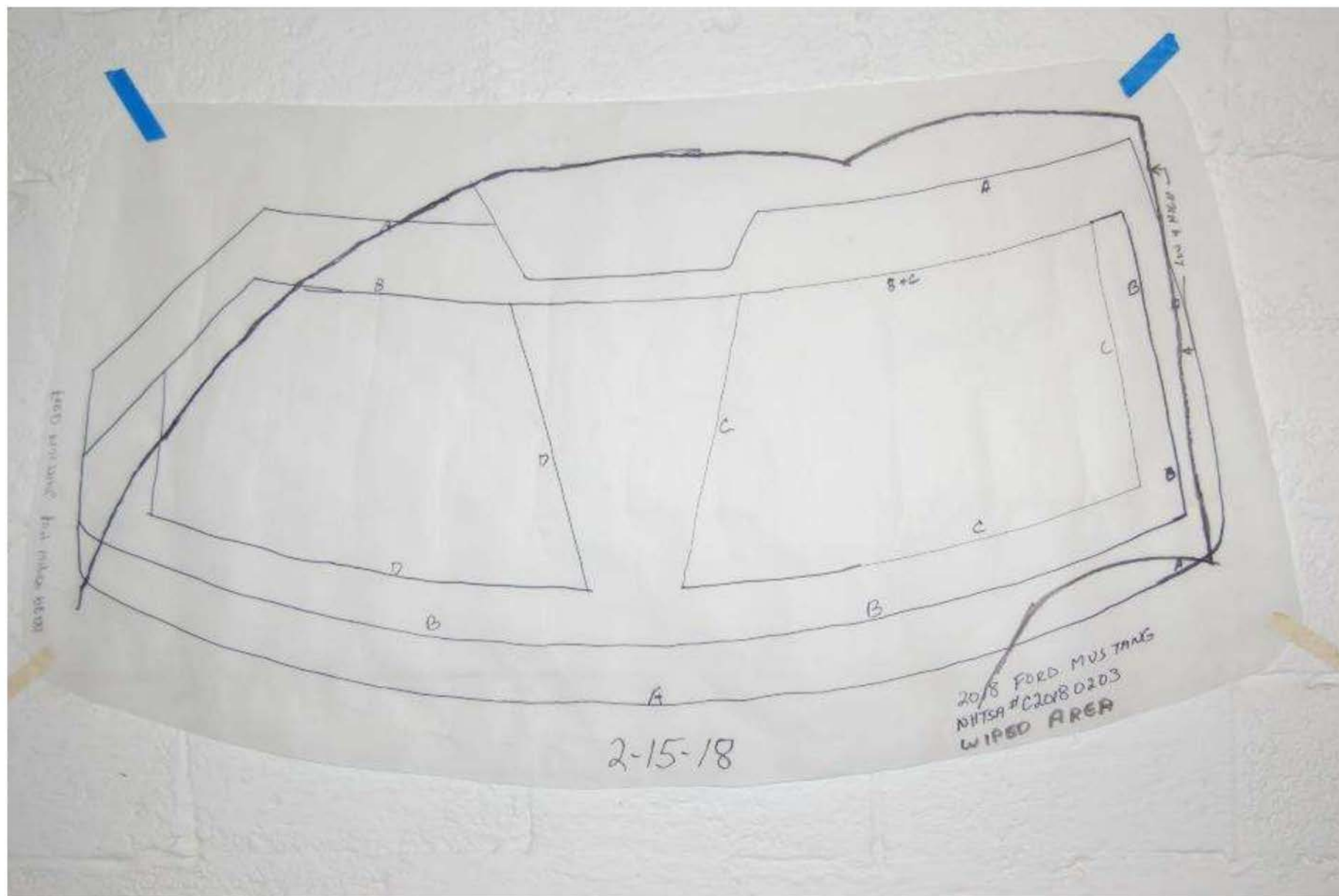
2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.8
WIPER AND WASHER CONTROL



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.9
WIPED AREA TEST IN PROGRESS



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.10
WIPE AREA TEST PATTERN



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.11
CAPABILITY TEST #1 PRE-COATED WINDSHIELD



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.12
CAPABILITY TEST #1 IN PROGRESS



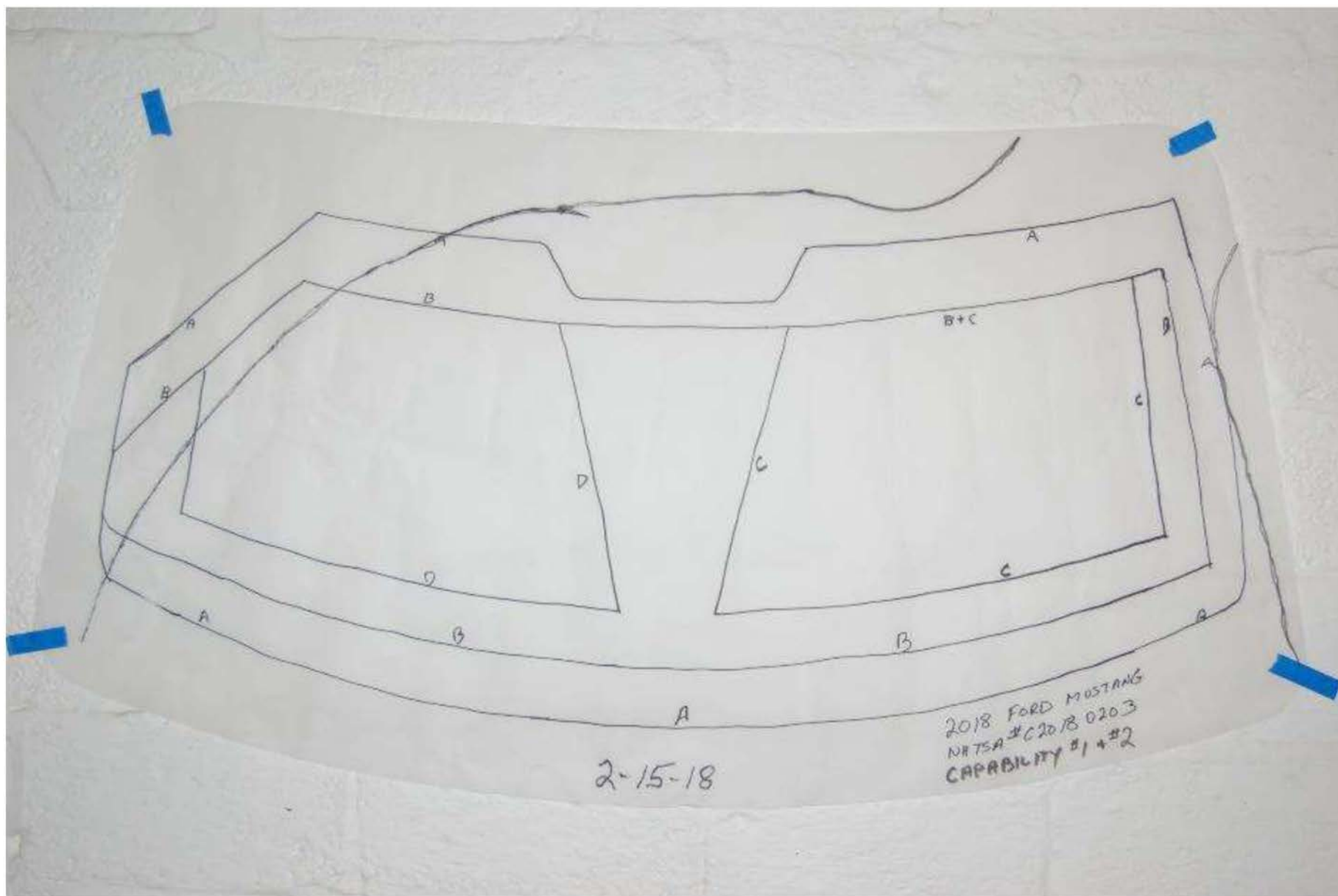
2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.13
CAPABILITY TEST #2 PRE-COATED WINDSHIELD



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.14
CAPABILITY TEST #2 IN PROGRESS



2018 FORD MUSTANG
NHTSA NO. C20180203
FMVSS NO. 104

FIGURE 5.15
CAPABILITY TEST #1 AND #2 PATTERN

SECTION 6

OWNER'S MANUAL INFORMATION

Wipers and Washers

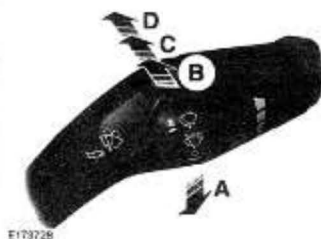
WINDSHIELD WIPERS

Note: Fully defrost the windshield before you switch the windshield wipers on.

Note: Make sure you switch the windshield wipers off before entering a car wash.

Note: If streaks or smears appear on the windshield, clean the windshield and the wiper blades. If that does not resolve the issue, install new wiper blades.

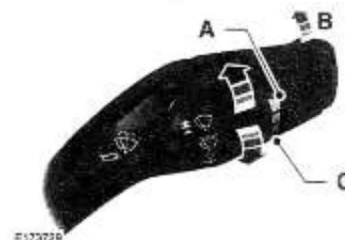
Note: Do not operate the wipers on a dry windshield. This may scratch the glass, damage the wiper blades or cause the wiper motor to burn out. Always use the windshield washers before wiping a dry windshield.



E17372B

- A Single wipe.
- B Intermittent wipe.
- C Normal wipe.
- D High speed wipe.

Intermittent Wipe



E17372B

- A Shortest wipe interval.
- B Intermittent wipe.
- C Longest wipe interval.

Use the rotary control to adjust the intermittent wipe interval.

Speed Dependent Wipers

When your vehicle speed increases, the interval between wipes decreases.

AUTOWIPERS (If Equipped)

Note: Fully defrost the windshield before you switch the windshield wipers on.

Note: Make sure you switch the windshield wipers off before entering a car wash.

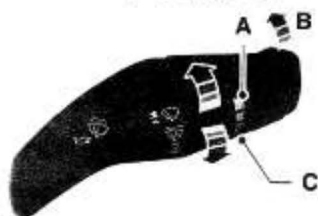
Note: If streaks or smears appear on the windshield, clean the windshield and the wiper blades. If that does not resolve the issue, install new wiper blades.

Note: If you switch autolamps and autowipers on, the headlamps turn on when the windshield wipers continuously operate.

Wet or winter driving conditions with ice, snow or salty road mist can cause inconsistent and unexpected wiping or smearing.

Wipers and Washers

The feature uses a rain sensor that is in the area around the interior mirror. The rain sensor monitors the amount of moisture on the windshield and turns on the wipers. It adjusts the wiper speed by the amount of moisture that the sensor detects on the windshield. You can switch this feature on and off in the information display. See **Information Displays** (page 88).



E173730

- A Highest sensitivity.
- B On.
- C Lowest sensitivity.

Use the rotary control to adjust the sensitivity of the autowipers. When you select low sensitivity, the wipers operate when the sensor detects a large amount of water on the windshield. When you select high sensitivity, the wipers operate when the sensor detects a small amount of water on the windshield.

Keep the outside of the windshield clean. The rain sensor is very sensitive and the wipers may operate if dirt, mist or insects hit the windshield.

In these conditions, you can do the following:

- Lower the sensitivity of the autowipers to reduce the amount of smearing on the windshield.
- Switch to normal or high-speed wipe.
- Switch autowipers off.

WINDSHIELD WASHERS

Note: Do not operate the washers when the washer reservoir is empty. This may cause the washer pump to overheat.



E173731

To operate the washers and spray the windshield, pull the lever toward you.