REPORT NO. 135-TRC-17-004

# COMPLIANCE TESTING FOR FMVSS 135
Light Vehicle Brake Systems

**********

MFD By Honda MFG. Of Indiana, LLC
Honda Civic LX, Passenger Car
NHTSA No. C20175304

TRANSPORTATION RESEARCH CENTER INC.
10820 State Route 347, P.O. Box B-67
East Liberty, Ohio 43319

5/3/17

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
1200 New Jersey Avenue S.E.
West Building 4th Floor
OVSC (NVS-221)
Washington, D.C. 20590

Prepared for the Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-16-D-00027.



Prepared By _____
Derek Bevis

Approved By _____
David Karls

Approval Date: 5/3/2017

Final Report Acceptance By OVSC:

_____
Contract Technical Manager, Office of Vehicle Safety Compliance

5/5/17
_____
Acceptance Date

| | | | |
|---|---|---|---|
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| 4. TITLE AND SUBTITLE:<br><br>Final report of FMVSS 135 Compliance Testing of a<br>2017 Honda Civic LX, Passenger Car<br>NHTSA No. C20175304 | | 5. REPORT DATE:<br><br>May 3, 2017<br>6. PERFORMING ORGANIZATION CODE:<br><br>TRC 20160483/3501 | |
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| 15. SUPPLEMENTARY NOTES: | | | |
| 16. ABSTRACT:<br><br>Compliance tests were conducted on the subject 2017 Honda Civic LX, Passenger Car, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-135-01 for the determination of FMVSS 135 compliance.<br><br>Test failures identified were as follows:<br><br>None. | | | |
| 17. KEY WORDS: Compliance Testing<br>Safety Engineering<br>FMVSS 135 | | 18. DISTRIBUTION STATEMENT:<br><br>Copies of this report are available from:<br>NHTSA Technical Information Services<br>NPO-411<br>1200 New Jersey Ave, S.E.<br>Washington, DC 20590<br>Email: tis@nhtsa.dot.gov<br>FAX: 202-493-2833 | |
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## 1.0 INTRODUCTION

Tests were conducted on a 2017 Honda Civic LX, Passenger Car, manufactured by Honda MFG. Of Indiana, LLC, to determine compliance with FMVSS 135 "Light Vehicle Brake Systems." All tests were conducted in accordance with the U.S. D.O.T., NHTSA Laboratory Procedure TP 135-01 and/or the corresponding TRC Inc. Test Procedure that was submitted to NHTSA for their approval. The Test Procedure was clearly described in the submitted document and has not been repeated in this report.

All stops were performed manually.

All tests were conducted by TRC Inc. personnel using the following TRC facilities:

7.5-Mile Test Track
Vehicle Maximum Speed

Skid Pad
Burnish
Cold Effectiveness Stops
High Speed Effectiveness Stops
Stops with Engine Off
Failed ABS
Failed Variable Proportioning Valve (if applicable)
Failed Hydraulic Circuits
Brake Power Assist Unit Failures
RBS Failure (if applicable)
EMF (Battery) Failure (if applicable)
Heating Snubs and Hot Performance Stops
Brake Cooling and Recovery Stops

Brake Slope
Parking Brake

Average PFC during the test period was 0.97 (Skid Pad) and 0.97 (Test Track) utilizing the ASTM E1337 w/E1136 tire method.

The test vehicle was ABS-equipped; therefore, the Wheel Lock Sequence and Adhesion Utilization Tests were not performed.

This vehicle appears to meet the requirements of FMVSS 135.

## 2.0 SUMMARY OF RESULTS

VEHICLE: 2017 Honda Civic LX NHTSA NO.: C20175304 DATE: 5/3/17

| | | Specification and Limit | | | | TEST RESULTS (In compliance if one stop meets requirement) | | |
|---|---|---|---|---|---|---|---|---|
| TEST | Loading Condition | Speed (km/h) | Min. Pedal Force (N) | Max. Pedal Force (N) | Stopping Distance Requirement (m) | Shortest Stop Max. Pedal Force Newtons (Average – N) | Shortest Stop Stopping Distance (m) (Corrected) | Pass / Fail |
| Equipment Requirements | | | | | Specified Equipment | Vehicle contains specified equipment | | Pass |
| Vehicle Maximum Speed | LLVW | NA | | | | 200.9 km/h avg. | | Pass |
| Burnish | GVWR | 80 | | | | 80 km/h stops @3.0mpsps | | Pass |
| Wheel Lockup Sequence w/o ABS | GVWR | | | | Lockup of front wheels prior to rear | ABS equipped – not required. | | NA |
| Wheel Lockup Sequence w/o ABS | LLVW | | | | | ABS equipped – not required. | | NA |
| Adhesion Utilization w/o ABS | LLVW | | | | Rear axle adhesion utilization curve below specified value | ABS equipped – not required. | | NA |
| Adhesion Utilization w/o ABS | GVWR | | | | | ABS equipped – not required. | | NA |
| Cold Effectiveness | GVWR | 100 | 65 | 500 | 70 | 308.7 | 42.3 | Pass |
| High Speed Effectiveness | GVWR | 160 | 65 | 500 | spd. depend. – 188 | 467.4 | 107.6 | Pass |
| Stops with Engine Off | GVWR | 100 | 65 | 500 | 70 | 448.8 | 41.9 | Pass |
| Cold Effectiveness | LLVW | 100 | 65 | 500 | 70 | 414.5 | 41.1 | Pass |
| High Speed Effectiveness | LLVW | 160 | 65 | 500 | spd. depend. – 188 | 473.9 | 107.0 | Pass |
| Failed Antilock | LLVW | 100 | 65 | 500 | 85 | 241.5 | 49.9 | Pass |
| Failed Proportioning Valve | LLVW | 100 | 65 | 500 | 110 | NA | NA | NA |
| Failed Hydraulic Circuit #1 | LLVW | 100 | 65 | 500 | 168 | 351.4 | 95.8 | Pass |
| Failed Hydraulic Circuit #2 | LLVW | 100 | 65 | 500 | 168 | 400.6 | 91.0 | Pass |
| Failed Hydraulic Circuit #1 | GVWR | 100 | 65 | 500 | 168 | 418.6 | 100.5 | Pass |
| Failed Hydraulic Circuit #2 | GVWR | 100 | 65 | 500 | 168 | 440.3 | 93.8 | Pass |
| Failed Antilock | GVWR | 100 | 65 | 500 | 85 | 335.9 | 52.6 | Pass |
| Failed Proportioning Valve | GVWR | 100 | 65 | 500 | 110 | NA | NA | NA |
| Regenerative Brake System (RBS) Failure | GVWR | 100 | 65 | 500 | 168 | NA | NA | NA |
| Electromotive Force (EMF) – Battery Failure | GVWR | 100 | 65 | 500 | 70 | NA | NA | NA |
| Power Brake Unit Failure | GVWR | 100 | 65 | 500 | 168 | 495.1 | 146.2 | Pass |
| Parking Brake - Uphill | GVWR | - | - | 400 | Hold for 5 min.? | 10.7 P-Brake | Yes-Holds | Pass |
| Parking Brake - Downhill | GVWR | - | - | 400 | Hold for 5 min.? | 10.9 P-Brake | Yes-Holds | Pass |
| Heating Snubs | GVWR | 120-60 | NA | NA | 15 Snubs- 3.0 mpsps | 41.6 Avg. | NA | Pass |
| Hot Performance Stop #1 | GVWR | 100 | 65 | 209.6 | 63.8 | 203.4 (187.1) | 52.4 | Pass |
| Hot Performance Stop #2 | GVWR | 100 | 65 | 500 | 89.0 | 399.3 (341.4) | 50.3 | Pass |
| Brake Cooling | GVWR | 50 | NA | NA | 4 Stops - 3.0 mpsps | 40.7 Avg. | NA | Pass |
| Recovery Performance Stop #1 | GVWR | 100 | 65 | 209.6 **avg** | One of the two stops between 31.6 and 56.1 meters. | 178.1 (139.3) | 46.2 | |
| Recovery Performance Stop #2 | GVWR | 100 | 65 | 209.6 **avg** | | 166.8 (141.3) | 45.2 | Pass |
| Final Inspection-Brake Integrity | Check components for detachment, fracture or lubricants. | | | | | No detachments or fractures-normal appear. & color | | Pass |
| Final Inspection- Reservoirs/Warning Indicators | Master cylinder or brake power reservoir shall meet the volume and label requirements of S5.4.2 and S5.4.3. | | | | | Brake system has sufficient capacity and indicators are in compliance. | | Pass |

## 3.0 TEST VEHICLE INFORMATION AND DATA SHEETS

The compliance data sheets associated with the FMVSS 135 Brake for NHTSA Vehicle No. C20175304 follow:

# Vehicle Specifications

Year: 2017
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Manufacture Date: 3/1/2017
VIN: 19XFC2F56HE039744
Transmission Type: Automatic, CVT
Engine Type: Gasoline, 4 cyl., DOHC, 16 Valve
Displacement: 2
Engine Horsepower: 158
Idle Speed (rpm): 900
No. of Axles: 2

Test Number: 4
GVWR (kg): 1695
GAWR Front (kg): 900
GAWR Rear (kg): 810
Wheelbase (mm): 2700
Odometer Start (mi): 83 mi.
Odometer End (mi): 558 mi.

**BUSES ONLY**

Chassis Mfg.: N/A
Serial Number: N/A
No. of Seats: N/A
Mfg. Date: N/A

**TIRES**

Size: 215/55R16 93H
Type: Kinergy, GT, Radial, Tubeless, M+S
Manufacturer: Hankook
Front GVWR Tire Pressure: 220.0 kPa
Rear GVWR Tire Pressure: 220.0 kPa

# Brake Application System

Series: Front: Disc Rear: Disc
Actuation: Diagonal
Foundation: Hydraulic
Parking Mechanism: Yes
Type of Parking Unit: Automatic transmission with park detent.

Master Cylinder Dia. (mm): 21.98
Pedal Ratio: 2.8:1
Anti-Skid Device: Yes
Anti-Skid Unit Mfg.: Continental

Power Unit: Vacuum
Power Assist Unit: N/A
Power Unit with Accumulator: N/A
Power Asst/Power Unit with Backup: N/A
Variable Proportioning System: N/A

# Brake Component Materials and Construction

Brake Type Front: Disc
Construction: Integral Cast Vented
Rotor Diameter (mm): 281.42
Rotor Thickness (mm): 23.01
Lining Construction: Bonded
Material: Cast Iron
Hydraulic Piston Dia. (mm): 54.91

**Inboard (Leading)**

Width (mm): 49.64
Length (mm): 126.59
Thickness (mm): 10.93
Lining Code/Color: AK NS369H FF

**Outboard (Trailing)**

Width (mm): 49.91
Length (mm): 126.52
Thickness (mm): 9.99
Lining Code/Color: AK NS369H FF

Brake Type Rear: Disc
Construction: Cast Unvented
Rotor Diameter (mm): 259.65
Rotor Thickness (mm): 9
Lining Construction: Bonded
Material: Cast Iron
Hydraulic Piston Dia. (mm): 35.48

**Inboard (Leading)**

Width (mm): 41.12
Length (mm): 82.8
Thickness (mm): 9.52
Lining Code/Color: GA 8135(4) FG

**Outboard (Trailing)**

Width (mm): 41.04
Length (mm): 83.04
Thickness (mm): 9.74
Lining Code/Color: GA 8135(4) FG

# Other Component Information

Friction-type Park Brake: Hand Operated
Non-Service Brake Type: N/A N/A

Technician: Derek Bevis Date: 5/3/2017

Quality Assurance: David Karls

Transportation Research Center Inc.

# Vehicle Weight

Odometer Start (mi): 83 mi. Odometer End (mi): 558 mi. Scales Used: Building 70 Mettler Scales

**GVWR/GAWR Information (From Vehicle Certification Label)**

GVWR (kg): 1695
GAWR Front (kg): 900
GAWR Rear (kg): 810

NOTE: GVWR, LLVW and axle weights to measure within +0% and -1%

**Unloaded Vehicle Weight UVW (kg)**

| | Left | Right | Total Axle | Total Weight |
|---|---|---|---|---|
| Front | 379.2 | 384.2 | 763.4 | 1,246.0 |
| Rear | 247.2 | 235.4 | 482.6 | |

**Target Light Loaded Vehicle Weight LLVW (kg)**

| | Left | Right | Total Axle | Total Weight |
|---|---|---|---|---|
| Front | 426.0 | 431.2 | 857.2 | 1,427.2 |
| Rear | 291.8 | 278.2 | 570.0 | |

**Actual Light Loaded Vehicle Weight LLVW (kg)**

| | Left | Right | Total Axle | Total Weight |
|---|---|---|---|---|
| Front | 429.4 | 428.0 | 857.4 | 1,427.2 |
| Rear | 293.8 | 276.0 | 569.8 | |

Load: Driver/Observer 100.0 (kg) + Instrumentation 18.0 (kg) + Ballast 63.0 (kg) = 181.0(kg)

NOTE 1: LLVW = UVW +181.4 kg

NOTE 2: Weight distributed in front passenger seat area.

NOTE 3: Neither axle load at LLVW less than at UVW; ballast as required.

**Fully Loaded Vehicle Weight GVWR (kg)**

| | Left | Right | Total Axle | Total Weight |
|---|---|---|---|---|
| Front | 449.6 | 442.4 | 892.0 | 1,695.0 |
| Rear | 414.0 | 389.0 | 803.0 | |

Load: Driver/Observer 100.0 (kg) + Instrumentation 18.0 (kg) + Ballast 331.0 (kg) = 449.0(kg)

NOTE 1: Vehicle loaded so axle loads proportional to GAWR shown previously.

NOTE 2: But no axle weight to be less than at LLVW.

NOTE 3: If weight on any axle at LLVW exceeds the axle's proportional share of the GVWR, the load required to reach GVWR is placed so that the weight on the axle remains the same as at LLVW.

Technician: Derek Bevis Date: 5/3/2017

Quality Assurance: David Karls

## Service Brake System (S5.1)

Vehicle equipped with a service brake acting on all wheels? Yes

**Wear Adjustment (S5.1.1)**

Service brakes are compensated for wear by means of a system of automatic adjustment? Yes

Description: Front & Rear: Disc, Automatic clearance take up.

**Wear Status (S5.1.2)**

Wear status of service brakes is indicated by:

(A) Acoustic or optical device? Yes

Description: Metal tab emitts high frequency squeal when worn.

or

(B) Visual check outside or under vehicle? Yes

Description: Front & Rear: Look through the caliper.

## Regenerative Braking System (S5.1.3)

EV with RBS, RBS is a part of the service brake system if automatically activated, there is no means to deactivate, and functions in all transmission positions? N/A

If equipped with ABS and RBS that is part of the service brake system, ABS controls RBS? N/A

## Parking Brake System (S5.2)

Vehicle equipped with a parking brake system of friction type with solely mechanical means to retain engagement? Yes

## Controls (S5.3)

(A) Service brakes activated by means of a foot control? Yes

(B) Parking brake control is independent of the service brake control? Yes

(C) Parking Brake control is hand or foot operated? Yes

(D) ABS, if equipped, cannot be manually disabled?

Data Indicates Compliance Yes

Comments:

Technician: Derek Bevis Date: 5/3/2017

Quality Assurance: David Karls

Transportation Research Center Inc.

Date Tested: 04/18/2017

# S4 Max. Speed at LLVW

Weather Conditions: 73ºF Wind: 12 mph at 159º

Start Odometer: 88 End Odometer: 103

**Schedule:**

LLVW, accelerate from 0 kph to Max.
speed attainable in 3.2 km on a level surface.

**Performance Requirements:**

None.

| Stop # | Max. Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Time 0-100 km/h (s) |
|---|---|---|---|---|---|---|
| 1 | *198.6* | 97.6 | 88.3 | 73.1 | 72.0 | 10.4 |
| 2 | *203.2* | 104.0 | 95.2 | 88.3 | 86.6 | 10.1 |

Average Speed = 200.9 kph

| Stop # | Direction of Run |
|---|---|
| 1 | South |
| 2 | North |

Comments: None

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/19/2017

# S7.1 Burnish at GVWR

Weather Conditions: 79ºF Wind: 17 mph at 252º

Start Odometer: 110 End Odometer: 363

**Schedule:**

Initial Brake Temperature less than 100ºC
Initial Speed 80 kph to zero
200 stops with transmission in gear

**Performance Requirements:**

Interval between runs: Time necessary to reduce IBT to 100ºC or 2 km distance, whichever occurs first.
constant decel rate: 3.0 m/s/s
Ped. Force ajusted to maintain constant decel
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Avg. Decel (m/s²) |
|---|---|---|---|---|---|---|---|---|
| 1 | 80.8 | 36.1 | 37.9 | 26.8 | 28.9 | 62.9 | 47.5 | 3.2 |
| 10 | 80.6 | 100.7 | 104.1 | 63.4 | 79.6 | 47.3 | 36.1 | 3.0 |
| 20 | 80.1 | 139.9 | 134.4 | 107.4 | 110.8 | 46.9 | 33.7 | 3.0 |
| 30 | 80.6 | 141.5 | 136.1 | 103.4 | 108.6 | 46.8 | 33.8 | 3.1 |
| 40 | 80.7 | 110.8 | 111.1 | 71.5 | 84.3 | 47.9 | 31.6 | 3.1 |
| 50 | 81.1 | 137.7 | 129.3 | 103.2 | 105.3 | 47.3 | 31.9 | 3.1 |
| 60 | 80.4 | 140.2 | 137.9 | 94.5 | 101.1 | 42.1 | 30.4 | 3.0 |
| 70 | 80.7 | 126.5 | 121.3 | 97.1 | 99.8 | 46.2 | 29.5 | 3.0 |
| 80 | 80.7 | 110.0 | 114.1 | 65.1 | 80.7 | 45.9 | 30.2 | 3.1 |
| 90 | 80.9 | 131.1 | 132.6 | 102.0 | 104.7 | 50.5 | 33.3 | 3.1 |
| 100 | 80.9 | 104.2 | 112.0 | 76.4 | 88.1 | 48.6 | 31.0 | 3.1 |
| 110 | 80.6 | 132.6 | 126.0 | 101.1 | 105.9 | 47.0 | 32.7 | 3.1 |
| 120 | 80.7 | 124.3 | 114.6 | 98.9 | 100.3 | 48.8 | 34.0 | 3.0 |
| 130 | 81.0 | 133.7 | 126.9 | 107.6 | 107.8 | 50.0 | 33.9 | 3.1 |
| 140 | 80.7 | 105.6 | 100.2 | 79.7 | 83.1 | 53.4 | 35.1 | 3.0 |
| 150 | 80.9 | 136.5 | 130.4 | 108.6 | 108.2 | 46.6 | 30.1 | 2.9 |
| 160 | 81.0 | 126.3 | 124.4 | 105.7 | 106.9 | 50.9 | 32.2 | 3.0 |
| 170 | 80.5 | 128.2 | 127.5 | 100.0 | 103.9 | 49.4 | 34.8 | 3.1 |
| 180 | 80.9 | 137.5 | 126.7 | 106.2 | 108.4 | 51.0 | 29.9 | 3.1 |
| 190 | 80.8 | 130.1 | 129.4 | 108.6 | 109.7 | 44.6 | 32.9 | 3.0 |
| 200 | 81.1 | 127.3 | 126.3 | 104.8 | 110.0 | 52.2 | 35.6 | 3.1 |

**Brake Adjustment** Schedule: Adjust service brakes; record procedure and amount adjusted.

Left Front : None
Right Front: None
Left Rear : None
Right Rear : None
Comments: None
Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/21/2017

# S7.5 Cold Effectiveness at GVWR

Weather Conditions: 58ºF Wind: 10 mph at 304º

Start Odometer: 369 End Odometer: 376

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 70m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.8 | 86 | 80 | 62 | 62 | 43.1 | 42.4 | 354.5 | 145.2 | 11.9 | 9.8 |
| 2 | 101.1 | 78 | 71 | 45 | 45 | 43.2 | 42.3 | 308.7 | 209.6 | 12.0 | 9.1 |
| 3 | 100.7 | 85 | 76 | 43 | 48 | 43.3 | 42.8 | 351.9 | 263.2 | 12.2 | 9.7 |
| 4 | 100.8 | 83 | 79 | 40 | 48 | 43.6 | 42.9 | 370.0 | 285.7 | 12.0 | 9.1 |
| 5 | 101.0 | 84 | 80 | 42 | 50 | 43.6 | 42.7 | 377.5 | 261.2 | 11.6 | 9.1 |
| 6 | 100.7 | 85 | 80 | 42 | 48 | 43.0 | 42.4 | 399.6 | 328.9 | 11.4 | 9.6 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |
| 5 | No | South | Yes |
| 6 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.
Comments: None

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/21/2017

# S7.6 High Speed Effectiveness at GVWR

Weather Conditions: 58ºF Wind: 13 mph at 328º

Start Odometer: 376 End Odometer: 399

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 160 kph to zero
6 stops with transmission in gear

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 188m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 160.9 | 85 | 77 | 45 | 48 | 110.7 | 109.5 | 322.8 | 238.0 | 11.1 | 9.1 |
| 2 | 160.2 | 84 | 73 | 46 | 53 | 109.6 | 109.3 | 428.0 | 318.8 | 12.5 | 9.2 |
| 3 | 160.2 | 86 | 78 | 55 | 57 | 110.5 | 110.2 | 393.2 | 321.1 | 13.0 | 9.2 |
| 4 | 159.8 | 85 | 81 | 56 | 58 | 107.9 | 108.1 | 447.6 | 340.7 | 12.8 | 9.4 |
| 5 | 160.3 | 86 | 80 | 54 | 59 | 108.8 | 108.4 | 407.5 | 345.0 | 13.0 | 9.8 |
| 6 | 160.3 | 89 | 84 | 58 | 60 | 108.0 | 107.6 | 467.4 | 353.6 | 13.6 | 9.9 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |
| 5 | No | South | Yes |
| 6 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.
Comments: None

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/24/2017

# S7.7 Stops with Engine Off at GVWR

Weather Conditions: 62ºF Wind: 9 mph at 77º

Start Odometer: 405 End Odometer: 415

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 70m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.9 | 72 | 73 | 47 | 51 | 51.7 | 50.8 | 401.0 | 337.4 | 9.4 | 8.2 |
| 2 | 101.1 | 70 | 72 | 41 | 44 | 43.1 | 42.2 | 437.5 | 293.1 | 12.2 | 9.9 |
| 3 | 101.0 | 79 | 82 | 47 | 51 | 43.1 | 42.2 | 439.9 | 338.9 | 12.1 | 9.8 |
| 4 | 100.6 | 77 | 80 | 44 | 48 | 42.7 | 42.2 | 472.7 | 342.6 | 11.8 | 9.8 |
| 5 | 100.6 | 80 | 84 | 46 | 50 | 42.6 | 42.0 | 426.1 | 360.9 | 11.9 | 9.9 |
| 6 | 101.1 | 84 | 88 | 49 | 54 | 42.9 | 41.9 | 448.8 | 352.0 | 11.8 | 9.2 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |
| 5 | No | South | Yes |
| 6 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.

Comments: None

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/24/2017

# S7.5 Cold Effectiveness at LLVW

Weather Conditions: 69ºF Wind: 12 mph at 100º

Start Odometer: 417 End Odometer: 427

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 70m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.5 | 76 | 77 | 48 | 51 | 42.5 | 42.1 | 363.8 | 311.4 | 12.0 | 10.0 |
| 2 | 100.4 | 92 | 93 | 47 | 49 | 41.9 | 41.6 | 420.4 | 320.5 | 13.1 | 9.4 |
| 3 | 100.5 | 90 | 92 | 43 | 47 | 42.1 | 41.7 | 420.1 | 334.7 | 12.3 | 9.5 |
| 4 | 100.9 | 85 | 87 | 42 | 47 | 41.8 | 41.1 | 414.5 | 340.2 | 12.2 | 8.9 |
| 5 | 100.5 | 83 | 86 | 39 | 43 | 42.3 | 41.9 | 417.9 | 334.3 | 12.1 | 8.9 |
| 6 | 100.6 | 86 | 88 | 40 | 44 | 42.6 | 42.1 | 440.2 | 371.1 | 12.1 | 10.0 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |
| 5 | No | South | Yes |
| 6 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.
Comments: None

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/24/2017

# S7.6 High Speed Effectiveness at LLVW

Weather Conditions: 72ºF Wind: 12 mph at 53º

Start Odometer: 427 End Odometer: 448

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 160 kph to zero
6 stops with transmission in gear

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 188m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 159.8 | 81 | 86 | 38 | 43 | 107.1 | 107.3 | 519.2 | 356.7 | 15.2 | 10.0 |
| 2 | 160.5 | 90 | 89 | 42 | 43 | 108.8 | 108.1 | 403.6 | 338.6 | 12.7 | 9.5 |
| 3 | 160.5 | 81 | 78 | 50 | 48 | 109.9 | 109.2 | 409.2 | 335.6 | 13.5 | 8.9 |
| 4 | 160.2 | 92 | 89 | 40 | 41 | 108.4 | 108.1 | 440.6 | 378.7 | 13.5 | 9.8 |
| 5 | 159.3 | 91 | 86 | 41 | 40 | 106.0 | 107.0 | 473.9 | 338.7 | 15.0 | 9.5 |
| 6 | 160.4 | 85 | 82 | 41 | 39 | 108.9 | 108.4 | 402.8 | 313.3 | 15.2 | 9.4 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |
| 5 | No | South | Yes |
| 6 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.
Comments: Over on Max Pedal Force on Stop #1 due to Driver error.

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/24/2017

# S7.8 Antilock Failure at LLVW

Weather Conditions: 55ºF Wind: 2 mph at 108º

Start Odometer: 450 End Odometer: 461

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 85m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.9 | 79 | 77 | 50 | 53 | 56.8 | 55.9 | 199.0 | 105.1 | 8.7 | 7.5 |
| 2 | 101.0 | 80 | 72 | 45 | 42 | 57.5 | 56.3 | 133.4 | 99.9 | 9.0 | 7.1 |
| 3 | 100.9 | 89 | 82 | 46 | 46 | 58.6 | 57.6 | 203.5 | 92.8 | 9.7 | 6.9 |
| 4 | 100.9 | 89 | 80 | 43 | 43 | 54.0 | 53.1 | 285.8 | 111.0 | 9.7 | 7.9 |
| 5 | 100.8 | 74 | 74 | 57 | 58 | 52.5 | 51.7 | 221.6 | 149.7 | 9.3 | 7.7 |
| 6 | 100.7 | 92 | 90 | 57 | 60 | 50.6 | 49.9 | 241.5 | 117.6 | 10.4 | 7.9 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |
| 5 | No | South | Yes |
| 6 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.

Comments: Disconnected the LF ABS sensor to induce ABS failure.

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/25/2017

# S7.10 Hydraulic Circuit Failure #1 at LLVW

Weather Conditions: 72ºF Wind: 9 mph at 128º

Start Odometer: 465 End Odometer: 471

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 168m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 101.3 | 31 | 81 | 60 | 26 | 98.3 | 95.8 | 351.4 | 316.3 | 6.0 | 4.3 |
| 2 | 100.8 | 36 | 89 | 46 | 28 | 99.8 | 98.3 | 336.0 | 291.6 | 5.8 | 4.3 |
| 3 | 101.0 | 39 | 87 | 38 | 26 | 98.4 | 96.5 | 441.1 | 364.2 | 6.3 | 4.3 |
| 4 | 100.9 | 42 | 89 | 36 | 27 | 100.0 | 98.3 | 425.9 | 375.2 | 6.0 | 4.3 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.

Comments: Subsystem #1 failed, No LF or RR brakes available.

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/25/2017

# S7.10 Redundant Hydraulic Circuit Fail #2 at LLVW

Weather Conditions: 75ºF Wind: 9 mph at 139º

Start Odometer: 472 End Odometer: 484

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 168m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.7 | 83 | 46 | 30 | 59 | 93.8 | 92.4 | 315.6 | 258.8 | 1.1 | -0.6 |
| 2 | 100.7 | 90 | 47 | 32 | 54 | 92.3 | 91.0 | 400.6 | 303.3 | 6.5 | 4.6 |
| 3 | 100.8 | 91 | 47 | 33 | 53 | 96.3 | 94.8 | 388.5 | 321.4 | 6.1 | 4.4 |
| 4 | 100.9 | 90 | 46 | 33 | 51 | 95.8 | 94.1 | 434.4 | 352.8 | 6.6 | 4.4 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.
Comments: Subsystem #2 failed, No RF or LR brakes available.

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/26/2017

# S7.10 Hydraulic Circuit Failure #1 at GVWR

Weather Conditions: 74ºF Wind: 13 mph at 193º  Start Odometer: 495 End Odometer: 503

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 168m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.8 | 41 | 78 | 59 | 29 | 103.4 | 101.7 | 419.6 | 345.9 | 5.2 | 4.1 |
| 2 | 100.7 | 36 | 84 | 49 | 27 | 101.9 | 100.5 | 418.6 | 382.8 | 5.4 | 4.2 |
| 3 | 100.6 | 38 | 93 | 49 | 29 | 104.2 | 103.0 | 435.6 | 365.1 | 5.4 | 4.0 |
| 4 | 100.8 | 41 | 84 | 48 | 30 | 103.7 | 101.9 | 418.9 | 384.4 | 5.6 | 4.1 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.

Comments: Subsystem #1 failed, No LF or RR brakes available.

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice  Observer: None

Recorded Data Processed by: Derek Bevis  Date:5/3/2017

Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/26/2017

# S7.10 Redundant Hydraulic Circuit Fail #2 at GVWR

Weather Conditions: 67ºF Wind: 13 mph at 198º  Start Odometer: 488 End Odometer: 494

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 168m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 101.0 | 85 | 33 | 23 | 68 | 99.0 | 97.0 | 375.0 | 285.7 | 6.8 | 4.3 |
| 2 | 100.7 | 80 | 34 | 23 | 47 | 102.0 | 100.6 | 373.4 | 282.7 | 6.0 | 4.2 |
| 3 | 101.1 | 85 | 41 | 21 | 44 | 95.9 | 93.8 | 440.3 | 301.7 | 7.6 | 4.4 |
| 4 | 101.2 | 90 | 45 | 23 | 50 | 97.6 | 95.3 | 429.5 | 327.1 | 6.2 | 4.4 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.
Comments: Subsystem #2 failed, No RF or LR brakes available.

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice  Observer: None
Recorded Data Processed by: Derek Bevis  Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/26/2017

# S7.8 Antilock Failure at GVWR

Weather Conditions: 82ºF Wind: 16 mph at 207º

Start Odometer: 505 End Odometer: 513

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 85m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.5 | 80 | 82 | 64 | 65 | 60.4 | 59.8 | 308.5 | 122.8 | 8.3 | 7.1 |
| 2 | 100.8 | 74 | 83 | 59 | 55 | 60.8 | 59.8 | 308.8 | 116.6 | 8.5 | 6.7 |
| 3 | 100.7 | 75 | 86 | 59 | 53 | 63.4 | 62.5 | 294.8 | 117.7 | 8.3 | 6.9 |
| 4 | 100.8 | 76 | 87 | 51 | 49 | 54.4 | 53.5 | 394.8 | 150.1 | 9.0 | 7.4 |
| 5 | 100.7 | 76 | 86 | 46 | 44 | 57.9 | 57.0 | 302.5 | 119.8 | 8.7 | 7.4 |
| 6 | 100.7 | 74 | 85 | 45 | 42 | 53.4 | 52.6 | 335.9 | 159.4 | 9.8 | 8.1 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |
| 5 | No | South | Yes |
| 6 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.

Comments: Disconnected the LF ABS sensor to induce ABS failure.

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/26/2017

# S7.11 Power Brake Unit Failure at GVWR

Weather Conditions: 83ºF Wind: 15 mph at 201º  Start Odometer: 515 End Odometer: 524

**Schedule:**

Initial Brake Temperature 65 -100 ºC
Initial Speed 100 kph to zero
6 stops with transmission in neutral

**Performance Requirements:**

One stop with:
Stopping distance less than or equal to 168m
Ped. Force between 65N and 500N
No lock up allowed longer than 0.1 sec above 15 kph
Vehicle must stay in lane of 3.5m

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.9 | 78 | 80 | 53 | 54 | 172.3 | 169.3 | 491.2 | 448.8 | 3.2 | 2.5 |
| 2 | 101.0 | 81 | 86 | 59 | 59 | 149.2 | 146.2 | 495.1 | 468.6 | 3.4 | 2.8 |
| 3 | 101.1 | 89 | 94 | 59 | 58 | 150.5 | 147.3 | 492.1 | 458.0 | 3.5 | 2.9 |
| 4 | 100.9 | 89 | 93 | 58 | 57 | 140.2 | 137.6 | 505.2 | 470.3 | 3.7 | 3.1 |
| 5 | 101.3 | 89 | 93 | 58 | 57 | 154.5 | 150.5 | 485.2 | 448.5 | 3.6 | 2.9 |
| 6 | 101.1 | 87 | 93 | 62 | 58 | 150.2 | 147.0 | 485.1 | 456.7 | 3.8 | 3.0 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |
| 5 | No | South | Yes |
| 6 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.

Comments: Over on Max Pedal Force on Stop #4 due to Driver error.
Failed vacuum brake booster by disconnecting the vacuum line from the engine to the brake booster.
Performed 10 firm applications of the service brake to deplete the system.

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice  Observer: None

Recorded Data Processed by: Derek Bevis  Date:5/3/2017

Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/27/2017

# S7.12 Parking Brake Static at GVWR

Weather Conditions: 69ºF Wind: 17 mph at 182º  Start Odometer: 528 End Odometer: 528

**Schedule:**

Initial Brake Temperature ≤100 ºC
or Ambient Temp. if non-service brake type materials
Loaded to GVWR with transmission in Neutral
Drive onto 20% slope in forward and reverse directions.

**Performance Requirements:**

Up to three Applies in each direction:
Parking brake must hold the vehicle stationary
in both directions for 5 miutes each
Ped. Force: Hand Control: <400N
Ped. Force: Foot Control: <500N

| Stop # | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Max. Ped. Force (N) | Max. P-Brake Force (N) |
|---|---|---|---|---|---|---|
| 1 | 52 | 51 | 38 | 43 | 45.8 | 10.7 |
| 2 | 38 | 41 | 29 | 33 | 43.9 | 10.9 |

Stationary time: 5 minutes

Comments: Stop #1 was performed Uphill, Stop #2 was performed Downhill.
Electronic push button type parking brake.

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice  Observer: None

Recorded Data Processed by: Derek Bevis  Date:5/3/2017

Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/27/2017

# S7.13 Heating Snubs at GVWR

Weather Conditions: 67ºF Wind: 15 mph at 248º

Start Odometer: 529 End Odometer: 542

**Schedule:**

Initial Brake Temperature 55 -65 ºC
Initial Speed 120 kph to 60
15 snubs with transmission in gear

**Performance Requirements:**

Maintain a constant Decel rate of 3.0 m/s $^2$
Attain the specified Decel within one second and maintain it for the remainder of the snub.
Maintain a time interval of 45s between the start of snubs.
Accelerate as rapidly as possible to the initial test speed immediately after each snub.

| Stop # | Avg. Decel (m/s $^2$) | Time Between Snubs (s) | Avg. Ped. Force (N) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Initial Speed (kph) |
|---|---|---|---|---|---|---|---|---|
| 1 | 3.1 | 0.0 | 46.1 | 62 | 57 | 45 | 47 | 120.4 |
| 2 | 3.0 | 46.4 | 37.6 | 103 | 94 | 81 | 85 | 121.4 |
| 3 | 3.2 | 45.0 | 37.3 | 145 | 133 | 111 | 120 | 120.9 |
| 4 | 3.2 | 45.5 | 39.2 | 180 | 166 | 134 | 148 | 120.6 |
| 5 | 3.1 | 44.9 | 35.0 | 209 | 194 | 155 | 173 | 121.0 |
| 6 | 3.3 | 45.6 | 41.3 | 229 | 215 | 173 | 194 | 121.3 |
| 7 | 3.1 | 44.7 | 40.9 | 247 | 232 | 192 | 216 | 120.7 |
| 8 | 3.1 | 45.4 | 42.2 | 262 | 248 | 210 | 233 | 121.5 |
| 9 | 3.1 | 44.3 | 41.6 | 278 | 262 | 228 | 250 | 121.7 |
| 10 | 3.0 | 45.0 | 40.3 | 294 | 274 | 246 | 263 | 121.5 |
| 11 | 3.3 | 44.6 | 45.6 | 308 | 285 | 261 | 274 | 121.7 |
| 12 | 3.1 | 45.1 | 46.4 | 318 | 298 | 274 | 285 | 121.4 |
| 13 | 3.1 | 45.4 | 45.8 | 323 | 309 | 282 | 293 | 121.8 |
| 14 | 3.2 | 44.6 | 43.3 | 326 | 316 | 285 | 298 | 122.4 |
| 15 | 3.2 | 45.4 | 42.1 | 329 | 322 | 289 | 302 | 121.5 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | North | Yes |
| 2 | No | East | Yes |
| 3 | No | South | Yes |
| 4 | No | South | Yes |
| 5 | No | South | Yes |
| 6 | No | South | Yes |
| 7 | No | West | Yes |
| 8 | No | North | Yes |
| 9 | No | North | Yes |
| 10 | No | North | Yes |
| 11 | No | East | Yes |
| 12 | No | South | Yes |
| 13 | No | South | Yes |
| 14 | No | South | Yes |
| 15 | No | South | Yes |

Comments: None

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/27/2017

# S7.14 Hot Performance at GVWR

Weather Conditions: 67ºF Wind: 15 mph at 248º

Start Odometer: 542 End Odometer: 542

**Schedule:**

Initial Speed 100 kph to zero
2 runs with transmission in neutral

**Performance Requirements:Performance Requirements:**

Run 1: Maintain an Avg. Ped. Force <= 209.6 N
Run 1: Stopping distance less than or equal to 63.8m
Run 2: Maintain an Avg. Ped. Force <= 500 N
Run 2: Stopping distance less than or equal to 89m
Based on shortest GVWR Cold Effectiveness stop # 2

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 101.0 | 342 | 334 | 298 | 310 | 53.4 | 52.4 | 203.4 | 187.1 | 9.5 | 7.6 |
| 2 | 100.4 | 355 | 346 | 310 | 325 | 50.7 | 50.3 | 399.3 | 341.4 | 10.1 | 7.9 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | West | Yes |
| 2 | No | West | Yes |

Corrected Distances are used to determine shortest stopping distance.

Comments: None

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/27/2017

# S7.15 Brake Cooling Stops at GVWR

Weather Conditions: 67ºF Wind: 15 mph at 248º

Start Odometer: 542 End Odometer: 546

**Schedule:**

Initial Speed 50 kph to zero
4 stops with transmission in gear
After each stop, immediately accelerate at the
Max. rate to 50 kph
Maintain that speed until beginning the next stop
at a distance of 1.5 km from the beginning of the previous stop

**Performance Requirements:**

Ped. Force adjust as necessary
Maintain a constant Decel rate of 3.0 m/s $^2$
No lock up allowed longer than 0.1 sec above 15 kph

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s $^2$) | Avg. Decel (m/s $^2$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 51.6 | 334 | 331 | 286 | 298 | 37.6 | 35.4 | 67.8 | 43.6 | 3.9 | 3.0 |
| 2 | 51.1 | 305 | 299 | 251 | 259 | 39.3 | 37.5 | 59.1 | 41.5 | 3.8 | 3.0 |
| 3 | 51.1 | 275 | 259 | 215 | 222 | 35.4 | 33.8 | 56.2 | 39.7 | 4.0 | 3.2 |
| 4 | 50.9 | 244 | 224 | 182 | 191 | 34.1 | 32.9 | 64.9 | 38.0 | 4.3 | 3.3 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | North | Yes |
| 2 | No | North | Yes |
| 3 | No | North | Yes |
| 4 | No | East | Yes |

Corrected Distances are used to determine shortest stopping distance.
Comments: None

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

Project Number: 20160483-3501
NHTSA Unit Number: C20175304

Test Number: 4
Manufacturer: MFD. By Honda MFG. Of Indiana, LLC
Make: Honda
Model: Civic LX
Body Style: Passenger Car
Front Cold Tire Pressure: 220.0 kPa
Rear Cold Tire Pressure: 220.0 kPa

Transportation Research Center Inc.

Date Tested: 04/27/2017

# S7.16 Recovery Performance at GVWR

Weather Conditions: 67ºF Wind: 15 mph at 248º

Start Odometer: 546 End Odometer: 547

**Schedule:**

Initial Speed 100 kph to zero
2 runs with transmission in neutral

**Performance Requirements:Performance Requirements:**

Maintain an Avg. Ped. Force <= 209.6 N
Stopping distance of at least one stop
within 31.6m to 56.1m
No lock up allowed longer than 0.1 sec above 15 kph
Based on shortest GVWR Cold Effectiveness stop # 2

| Stop # | Initial Speed (kph) | Left Front IBT (ºC) | Right Front IBT (ºC) | Left Rear IBT (ºC) | Right Rear IBT (ºC) | Actual Distance (m) | Corrected Distance SAE J299 (m) | Max. Ped. Force (N) | Avg. Ped. Force (N) | Max. Decel (m/s 2) | Avg. Decel (m/s 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 101.1 | 229 | 211 | 170 | 181 | 47.2 | 46.2 | 178.1 | 139.3 | 11.3 | 9.5 |
| 2 | 100.8 | 240 | 223 | 178 | 190 | 46.0 | 45.2 | 166.8 | 141.3 | 11.1 | 8.8 |

| Stop # | Wheel Lock Up | Direction of Stop | Stay In Lane |
|---|---|---|---|
| 1 | No | South | Yes |
| 2 | No | South | Yes |

Corrected Distances are used to determine shortest stopping distance.
Comments: None

Data Indicates Compliance: Yes

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

**Test Completion Inspection (7.17)**

VEHICLE: 2017 Honda Civic LX NHTSA NO.: C20175304 ODO.: 558 mi. DATE: 5/3/2017

System Integrity (S5.6)

Each vehicle shall meet the complete performance requirements of this standard without:
(a) Detachment or fracture of any component of the braking system such as brake springs and brake shoes or disc pad facings, other than minor cracks, that do not impair attachment of the friction facings. All mechanical components of the braking system shall be intact and functional. Friction facing tearout (complete detachment of lining) shall not exceed 10 percent of the lining on any single frictional element.
(b) Any visible brake fluid or lubricant on the friction surface of the brake or leakage at the master cylinder or brake power unit reservoir cover, seal, and filler openings.

| **Friction Material Condition: Primary/Inner** | | **Friction Material Condition: Secondary/Outer** | |
|---|---|---|---|
| LF | Normal Appearance & Color | LF | Normal Appearance & Color |
| RF | Normal Appearance & Color | RF | Normal Appearance & Color |
| LR | Normal Appearance & Color | LF | Normal Appearance & Color |
| RR | Normal Appearance & Color | RR | Normal Appearance & Color |
| **Drum (or Rotor) Condition:** | | **Brake Fluid/Lubricant Inside Brakes:** | |
| LF | Normal Appearance & Color | LF | None |
| RF | Normal Appearance & Color | RF | None |
| LR | Normal Appearance & Color | LR | None |
| RR | Normal Appearance & Color | RR | None |
| **Hydraulic Component Condition:** | | **Mechanical Component Condition:** | |
| LF | Good | Brk/Pedal | Good |
| RF | Good | Power Brk | Good |
| LR | Good | Stop/Lamp | Good |
| RR | Good | Linkage | Good |
| M/Cyl | Good | Other | NA |

COMPLIANCE: Yes X No___
Comments: None.

Technician: Derek Bevis

## TEST COMPLETION INSPECTION (S7.17)

VEHICLE: 2017 Honda Civic LX; NHTSA NO.: C20175304 GVWR: 1695 kg
MASTER CYLINDER RESERVOIR:

| DATE | | Requirements | Pass | Fail |
|---|---|---|---|---|
| **Reservoir Compartments (S5.4.1)** | | | | |
| (1) Does master cylinder have a reservoir compartment for each brake subsystem? | ***Yes*** | Master cylinder shall have a reservoir compartment for each subsystem. | X | |
| | No | | | |
| (2) Does loss of fluid in one compartment result in complete loss from another compartment? | Yes | Loss of fluid from one compartment shall not cause complete loss from another compartment. | X | |
| | ***No*** | | | |
| **Reservoir Capacity (S5.4.2)** | | | | |
| Shall conform to requirements (1) or (2), state units:<br><br>(1) For reservoirs having completely separate compartments for each subsystem (two separate, independent reservoirs): | | | | |
| Subsystem 1<br>Subsystem reservoir capacity | | Each compartment (reservoir) shall have a minimum capacity equivalent to the fluid displacement resulting when all wheel cylinders or caliper pistons serviced by that independent compartment/reservoir moves from a new lining, fully retracted position to a fully worn, properly adjusted, fully applied position.<br><br>(Use CALCULATION OF MINIMUM RESERVOIR VOLUME REQUIREMENTS Data Sheet ) | NA | NA |
| Subsystem 1<br>Fluid displaced from new to worn lining | | | | |
| Subsystem 2<br>Subsystem reservoir capacity | | | NA | NA |
| Subsystem 2<br>Fluid displaced from new to worn lining | | | | |
| 2) For reservoirs utilizing a portion of the reservoir for a common supply to two or more subsystems: | | | | |
| **Total** minimum capacity for the entire master cylinder reservoir (includes individual compartment reservoirs) | 365 ml | Shall have total minimum capacity for entire reservoir for displacement resulting from all subsystem wheel cylinders or caliper positions moving from new lining to full worn condition as above. | X | |
| Fluid displaced from new to worn linings (ALL linings)<br><br>*Value calculated from CALCULATION OF MINIMUM RESERVOIR VOLUME REQUIREMENTS Data Sheet | 136.8 ml* | | | |

Comments: None

Technician: Derek Bevis

## TEST COMPLETION INSPECTION (S7.18)

VEHICLE: 2017 Honda Civic LX; NHTSA NO.: C20175304 GVWR: 1695 kg

MASTER CYLINDER RESERVOIR:

| DATE | | Requirements | Pass | Fail |
|---|---|---|---|---|
| Master Cylinder Piston Displacement(S5.4.2) [If Common Reservoir Supply – continued from previous page] | | | | |
| Fluid displaced by three strokes of master cylinder piston for Subsystem No. 1. | 25 ml | Individual partial compartments of reservoir shall **each** have a minimum of fluid equal to at least the volume displaced by the master cylinder piston servicing the subsystem during a full stroke of the piston.<br><br>**NOTE:** Procedure uses three strokes to ensure an accurate measurement. | | |
| Fluid displaced by three strokes of master cylinder piston for Secondary (Subsystem No. 2) | 25 ml | | | |
| Fluid displaced per stroke, Subsystem No. 1. | 8.3 ml | | | |
| Fluid displaced per stroke, Subsystem No. 2. | 8.3 ml | | | |
| Fluid available in partial compartment Subsystem No. 1 | 32 ml | | X | |
| Fluid available in partial compartment Subsystem No. 2 | 50 ml | | X | |
| **Brake Power Unit Reservoir (S5.4.2)** | | | | |
| Volume displaced in charging system piston or accumulator to normal operating pressure plus wheel cylinder or caliper piston displacement. | | Shall have a capacity at least equal to fluid displacement required to charge the system pistons on accumulators to normal operating pressure plus displacement when wheel cylinders or caliper pistons move from new lining to full worn condition as above. | NA | |
| **Reservoir Labeling (S5.4.3)** | | | | |
| Exact copy of reservoir label:<br>On top of master cylinder reservoir: WARNING CLEAN FILLER CAP BEFORE REMOVING. USE ONLY DOT3 OR DOT 4 BRAKE FLUID FROM A SEALED CONTAINER. | | Label shall read: "Warning, clean filler cap before removing; use only * fluid from a sealed container".<br>* Fluid type specified in 49 CFR 571.116 | X | |
| Measure letter height | 3.2 mm | Letters shall be at least 3.2 mm/ 0.125" high | X | |
| Describe label attachment method and location. Embossed on the top of the master cylinder reservoir cap. | | Lettering shall be permanently affixed, engraved or embossed and located so as to be visible by direct view either on or within 100 mm/3.94 inches of the brake fluid reservoir filler plug or cap. | X | |
| Does the lettering contrast with the background? | ***Yes***<br>No | If label is not engraved or **embossed**, letters shall be of a color that contrasts with the background | X | |

Comments: None

Technician: Derek Bevis

**TEST COMPLETION INSPECTION (S7.18)**

VEHICLE: 2017 Honda Civic LX; NHTSA NO.: C20175304 DATE: 5/3/2017

BRAKE SYSTEM WARNING INDICATOR (S5.5)

| CONDITION | ANSWER | REQUIREMENTS | PASS | FAIL |
|---|---|---|---|---|
| Brake Systems Indicator Lamp Function Check (S5.5.2) (Bulb and systems check) | | | | |
| Describe location of brake indicator lamp: Located to the right of the fuel level gauge. | NA | Shall be in front, and in clear view, of driver. | X | |
| Does lamp light with ignition (start) switch at ON/RUN? | Yes | Automatic activation when ignition switch is "on" when engine **not running**, or ignition between "on" and "start" if is manufacturer check position- OR -single manual action by driver | X | |
| Does lamp light with ignition between ON and Start? | Yes | | | |
| Brake check description in owner's manual? | Yes | Manufacturer shall explain the brake check function test procedure in the owner's manual. | X | |
| **Brake System Warning Indicator ACTIVATION (S5.5.1) DURATION (S5.5.3) FUNCTION (S5.5.4)** | | | | |
| **CONDITION** | **Light ON?** | **REQUIREMENT** | **PASS** | **FAIL** |
| A. In event of hydraulic leak (1) On or before appearance of pressure differential of 218 psi (split system) | NA | When ignition (Start) switch is **ON**, lamp must light whenever (A), (B), (C), or (D) occurs. In addition, if service brake system is not a split system, audible warning must be activated when any condition in (A) exists. Visual warning indicator for non-split systems must be flashing. | X | |
| (2) If any reservoir falls below either "safe" level or 25% of capacity, whichever is greater.<br><br>Values: 165 **ml** or cc remaining = 45.2 % | Yes | | | |
| (3) On or before supply pressure to brake power unit falls to 50% | NA | | | |
| B. Electrical functional failure in an antilock or variable brake proportioning system. | NA | | X | |
| C. Application of the parking brake. | Yes | | | |
| D. Brake lining wear-out if optical warning. | NA | | | |
| E. *For a vehicle with electrically-actuated service brakes, failure of the source of electric power to the brakes or diminution of state of charge of the batteries.* | NA | | | |
| F. *For a vehicle with electric transmission of the service brake control signal, failure to a brake control circuit.* | NA | | | |
| G. *For an EV with RBS that is part of the service brake system failure of RBS.* | NA | | | |
| **Must have Audible alarm** if not split system and a condition in (a) above exists? | NA | | | |
| If condition (A) (2) above does not exist, then fluid reservoir must be **transparent** for fluid check without the need for reservoir to be opened? (S5.4.4) | Yes | | | |
| Indicator lamps remain activated as long as condition exists - ignition "on", and engine on or off? _____ (S5.5.3 DURATION)) | Yes-cont.<br>NA | | | |
| Visual warning – continuous or flashing?<br>Audible warning –continuous or flashing? | | | | |

Comments:

Technician: Derek Bevis

## TEST COMPLETION INSPECTION (S7.18)

VEHICLE: 2017 Honda Civic LX NHTSA NO.: C20175304 DATE: 5/3/2017

BRAKE SYSTEM WARNING INDICATOR LABELING (S5.5.5)

| CONDITION AND REQUIREMENT | ANSWER<br>NOTE: Standard requires that the answer to questions be YES | PASS | FAIL |
|---|---|---|---|
| Are visual indicators legible to driver in daylight and nighttime conditions when activated? | Yes | X | |
| Are visual indicator words 3.2 mm (.125") high minimum?<br>Record Height: "Brake" – 3.2 mm; "ABS" – 3.2 mm; | Yes | X | |
| Visual indicator words and background contrasting colors, one of which is red. Record colors_Letters –Red, Lens – Black | Yes | X | |
| If split system, is there one brake indicator? If yes, does it say the word "Brake"? (With one symbol adjacent.) | Yes | X | |
| If not split system; is there a separate indicator for loss of fluid or fluid pressure? Does this indicator say "Stop-Brake Failure"? Are the letters block and not less than 6.4 mm (.25") in height?<br>Record letter height_____ | NA | | |
| If separate indicator for:<br>1. Low brake fluid per S5.5.1(a)(1), does indicator say "Brake Fluid"? NOTE: not required for mineral oil system<br>Record wording:___NA_____<br>2. Gross pressure loss per S5.5.1(a)(2), does indicator say "Brake Pressure"?<br>Record wording: ___NA_____<br>3. Electrical functional failure in antilock or variable proportioning system per S5.5.1(b), letters and background contrasting colors one of which is yellow? Record colors__Lens – Black, Letters – Yellow.<br>Does indicator say "Antilock" or "ABS" or "Brake Proportioning"?<br>Record wording:_"ABS".<br>4. Parking brake per S5.5.1(c), does indicator say "Park" or "Parking Brake"?<br>Record wording: ___NA_____.<br>5. Brake lining wear-out per S5.5.1(d), does indicator say "Brake Wear"?<br>Record wording -_____.<br>6. *If separate indicator for RBS, the letters and background shall be of contrasting colors, one of which is yellow. The indicator shall be labeled "RBS". RBS failure in a system which is part of the service brake system may also be indicated by a yellow lamp that also indicates "ABS" failure and displays the symbol "ABS/RBS." Record wording*:_<br>7. For any other function? If yes,<br>Record_____NA_____ | NA<br>NA<br>Yes<br>NA<br>NA<br>NA<br>NA | X | |

DATA INDICATES COMPLIANCE: YES__X___ NO_____

Comments: None.

Technician: Derek Bevis

## CALCULATION OF MINIMUM RESERVOIR VOLUME REQUIREMENTS

VEHICLE: 2017 Honda Civic LX NHTSA NO.: C20175304 DATE: 5/3/2017

| BRAKE | | LINING | | |
|---|---|---|---|---|
| **LOCATION** | **TYPE** | **DESCRIPTION** | **MINIMUM THICKNESS** | **THICKNESS TO FULLY WORN (1) mm*** |
| Left Front | Drum | Leading | Pre-test 10.93 mm | |
| | | Primary | Post Test 10.53 mm | |
| | | Inboard X | Δ 0.40 mm | |
| | Disc X | Trailing | Pre-test 9.99 mm | |
| | | Secondary | Post Test 9.78 mm | |
| | | Outboard X | Δ 0.21 mm | |
| LINING CLEARANCE: | Diametrical (2): N/A | Inboard – app 0 mm. | Outboard – app 0 mm. | |
| WHEEL CYLINDER DIAMETER (3) N/A | | CALIPER PISTON DIAMETER (3): 54.91 mm x 1 pistons | | |
| SHOE CAGE DIAMETER (4) N/A ; CENTER POINT OF BRAKE ASSY TO CENTER POINT OF W.C. N/A | | | | |
| Right Rear | Drum | Leading | Pre-test 9.52 mm | |
| | | Primary | Post Test 9.32 mm | |
| | | Inboard X | Δ 0.20 mm | |
| | Disc X | Trailing | Pre-test 9.74 mm | |
| | | Secondary | Post Test 9.71 mm | |
| | | Outboard X | Δ 0.03 mm | |
| LINING CLEARANCE: | Diametrical (2) NA | Inboard – app 0 mm | Outboard – app 0 mm | |
| WHEEL CYLINDER DIAMETER (3): NA | | CALIPER PISTON DIAMETER (3): 35.48 mm x 1 piston | | |
| SHOE CAGE DIAMETER (4): NA | | CENTER POINT OF BRAKE ASSY TO CENTER PT. OF W.C.: NA | | |
| CIRCUIT #1 CONSISTS OF: | LF - X | LR | RF | RR - X |
| CIRCUIT #2 CONSISTS OF: | LF | LR - X | RF - X | RR |
| (1) MFRS. RECOMMENDATIONS – FRONT and REAR: NA | | | | |
| (2) DRUM BRAKES, MEASURED AT HORIZONTAL CENTERLINE: NA | | | | |
| (3) MFRS. DATA: NA<br>(4) RESET POSITION: NA | | | | |

Comments: None.

Technician: Derek Bevis

Vehicle: 2017 Honda Civic LX; NHTSA No.: C20175304; Date: 5/3/2017

Determination of Master Cylinder Volume Requirement
Determining the minimum volume requirements. The measured data is taken from the previous page, and the manufacturer's data is taken from Appendix E (when made available).

DISC BRAKES

Volume Required, $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times [\pi (D^2)]/4$, where

$V_r$ = Volume required per wheel
$\Delta t$ = Change in thickness (average)
i = Inboard
o = Outboard
D = Caliper cylinder diameter
c = Average clearance

DRUM BRAKES

Volume Required, $V_r = ((2C + \Delta t_s + t_p)/ \cos \alpha) \times \pi r^2$, $\alpha = \sin^{-1}(2 Y/D)$, where

$V_r$ = Volume required per wheel
C = Manufacturer's recommended drum-to-lining clearance
$\Delta t_p$ = Change in thickness of primary lining
$\Delta t_s$ = Change in thickness of secondary lining
Y = Center point of wheel cylinder to center point of brake assembly
r = Radius of wheel cylinder bore
D = Cage diameter

Using the above equations, the volume requirements for Subsystem No. 1 and Subsystem No. 2 were calculated utilizing measured and manufacturer's provided data to create the greatest displacement, as shown on next page:

Front
Disc Brake: $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi D^2}{4}$

| | |
|---|---|
| $\Delta t_i$ | 10.93 mm |
| $\Delta t_o$ | 9.99 mm |
| $t_{ic}$ | 0.0 mm |
| $t_{oc}$ | 0.0 mm |
| D | 54.91 mm x 1 |

$V_r = (10.93 + 0.0) \frac{\pi (54.91)^2}{4} + (9.99 + 0.0) \frac{\pi (54.91)^2}{4}$

$= (10.93) (2366.9) + (9.99) (2366.9)$

$= 25799 + 23645$

$= 49444 \text{ mm}^3 = 49.4 \text{ ml} \times 1 \text{ piston} = 49.4 \text{ ml}$

(Rear)

Disc Brake: $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi D^2}{4}$

| | |
|---|---|
| $\Delta t_i$ | 9.52 mm |
| $\Delta t_o$ | 9.74 mm |
| $t_{ic}$ | 0.0 mm |
| $t_{oc}$ | 0.0 mm |
| D | 35.48 mm x 1 |

$$V_r = (9.52 + 0.0)\frac{\pi (35.48)^2}{4} + (9.74 + 0.0)\frac{\pi (35.48)^2}{4}$$

$$= (9.52)(988.2) + (9.74)(988.2)$$

$$= 9408 + 9625$$

$$= 19033 \text{ mm}^3 = 19.0 \text{ ml x 1 piston} = 19.0 \text{ ml}$$

| Subsystem 1 | LF | RR | Totals |
|---|---|---|---|
| | 49.4 ml | 19.0 ml | 68.4 ml |
| Subsystem 2 | RF | LR | |
| | 49.4 ml | 19.0 ml | 68.4 ml |

*TOTAL VOLUME REQUIRED = $V_t = V_{r1} + V_{r2}$ = 68.4 + 68.4 = **136.8 ml**

## 4.0 NOTICE OF POSSIBLE NON-COMPLIANCE

This vehicle (C20175304) appears to meet the requirements of the FMVSS 135 Standard.

## 5.0 PHOTOGRAPHS

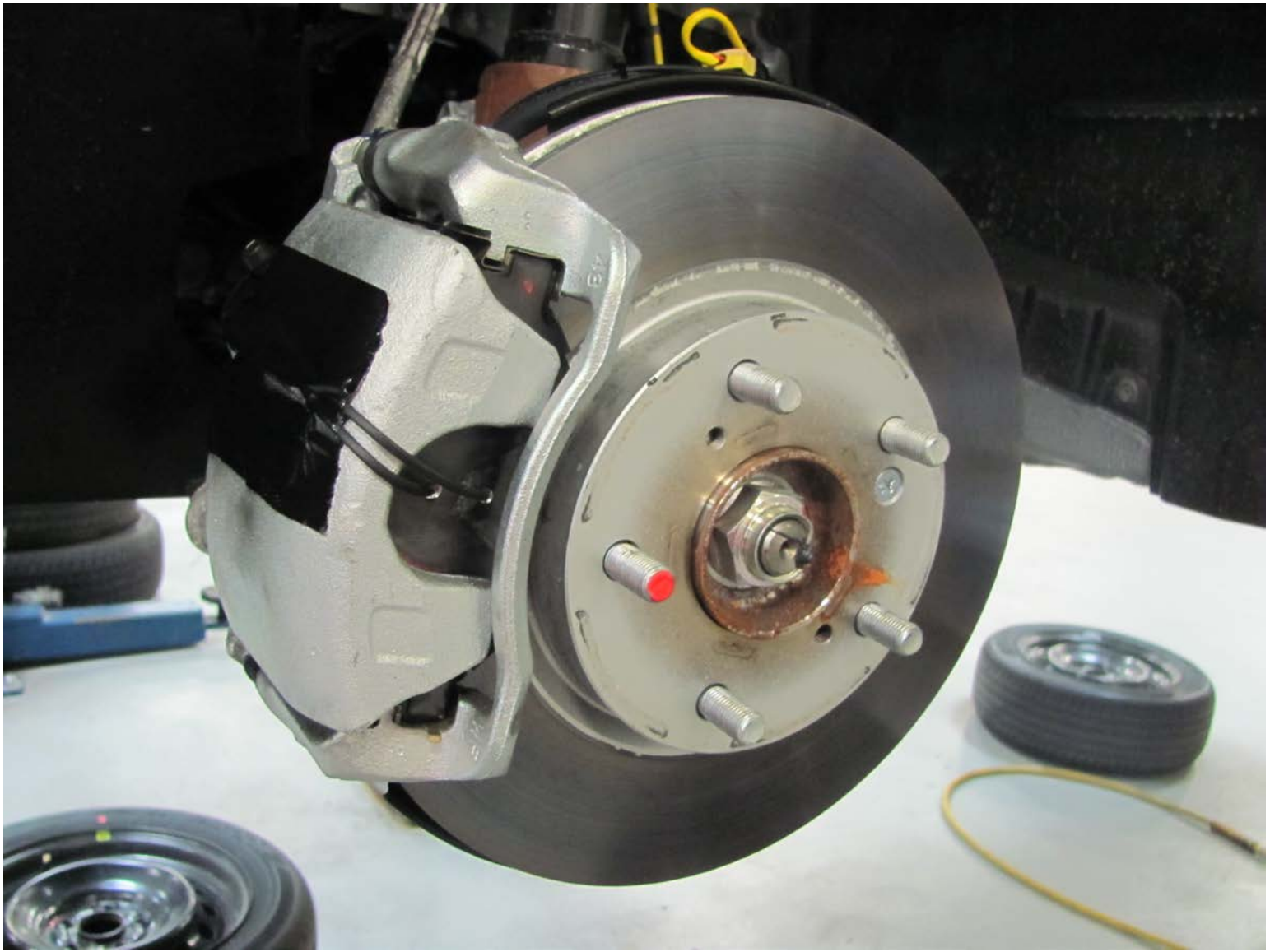
Photographs to document the vehicle, the instrumentation and ballast used, plus any other pertinent information are included in this report.


Left Front ¾ View


Right Rear ¾ View

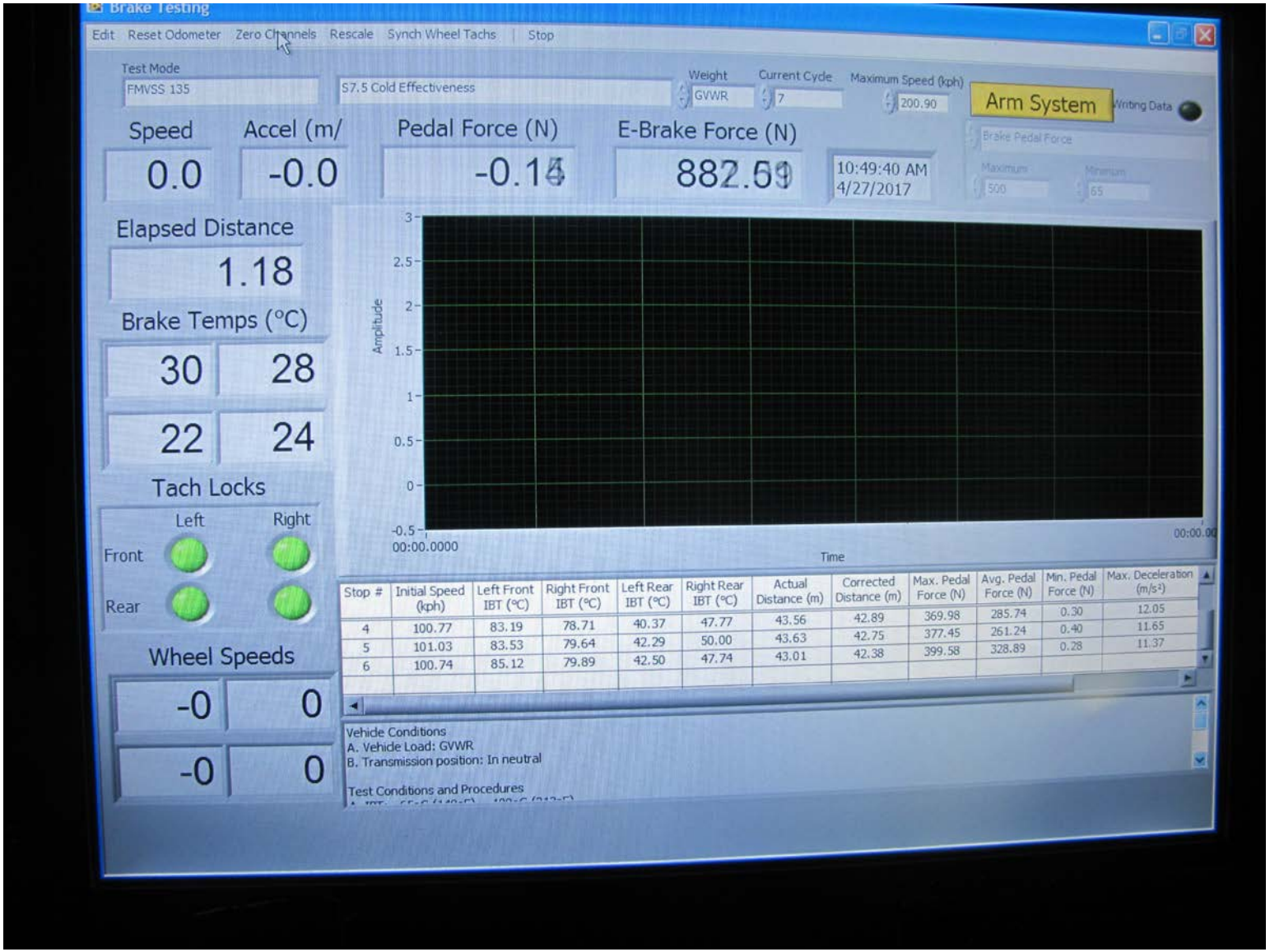

Vehicle Certification Placard


Tire Information Label



Left Front Thermocouple Installation

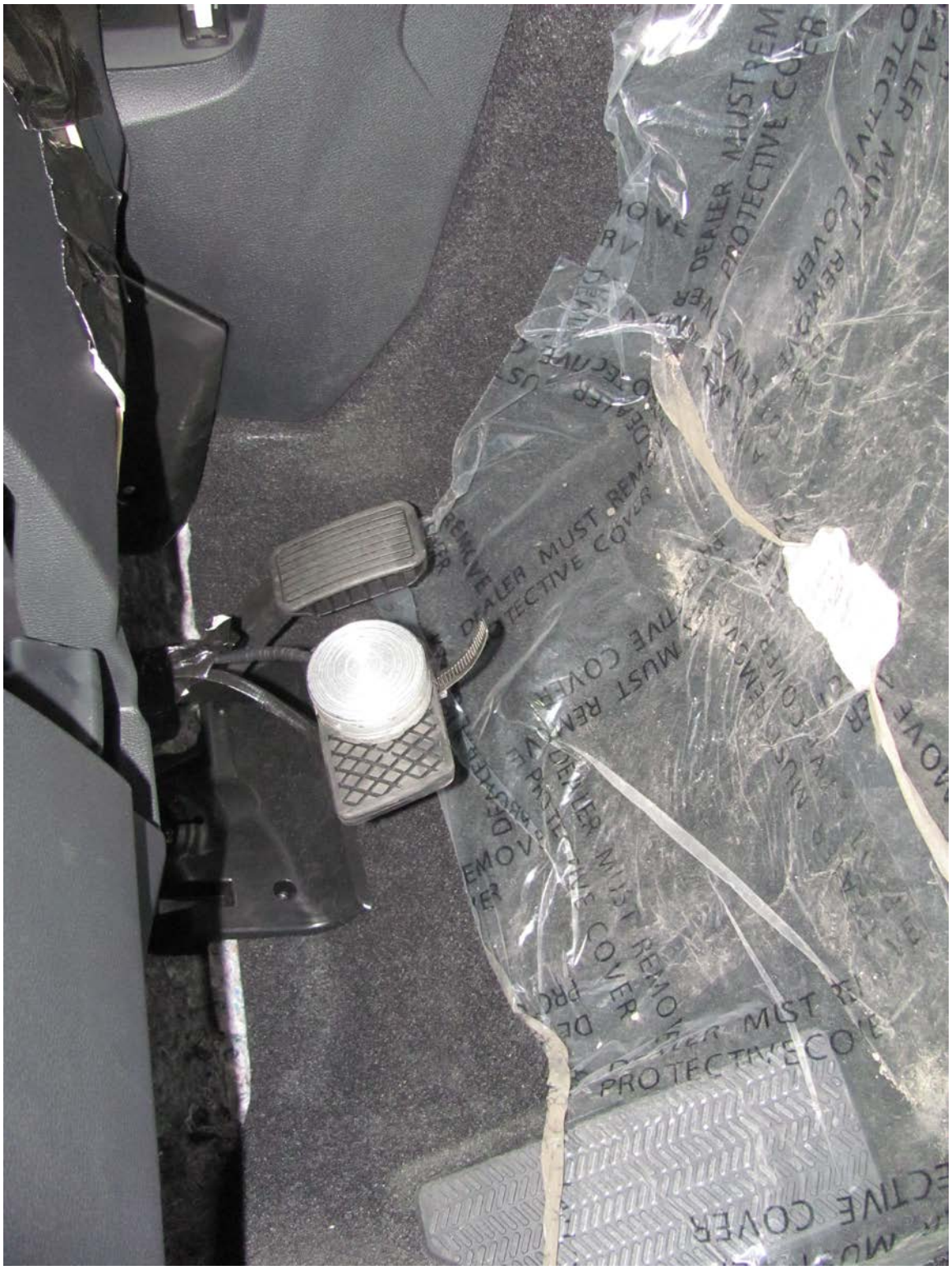
Right Rear Thermocouple Installation




Test Instrumentation in Vehicle

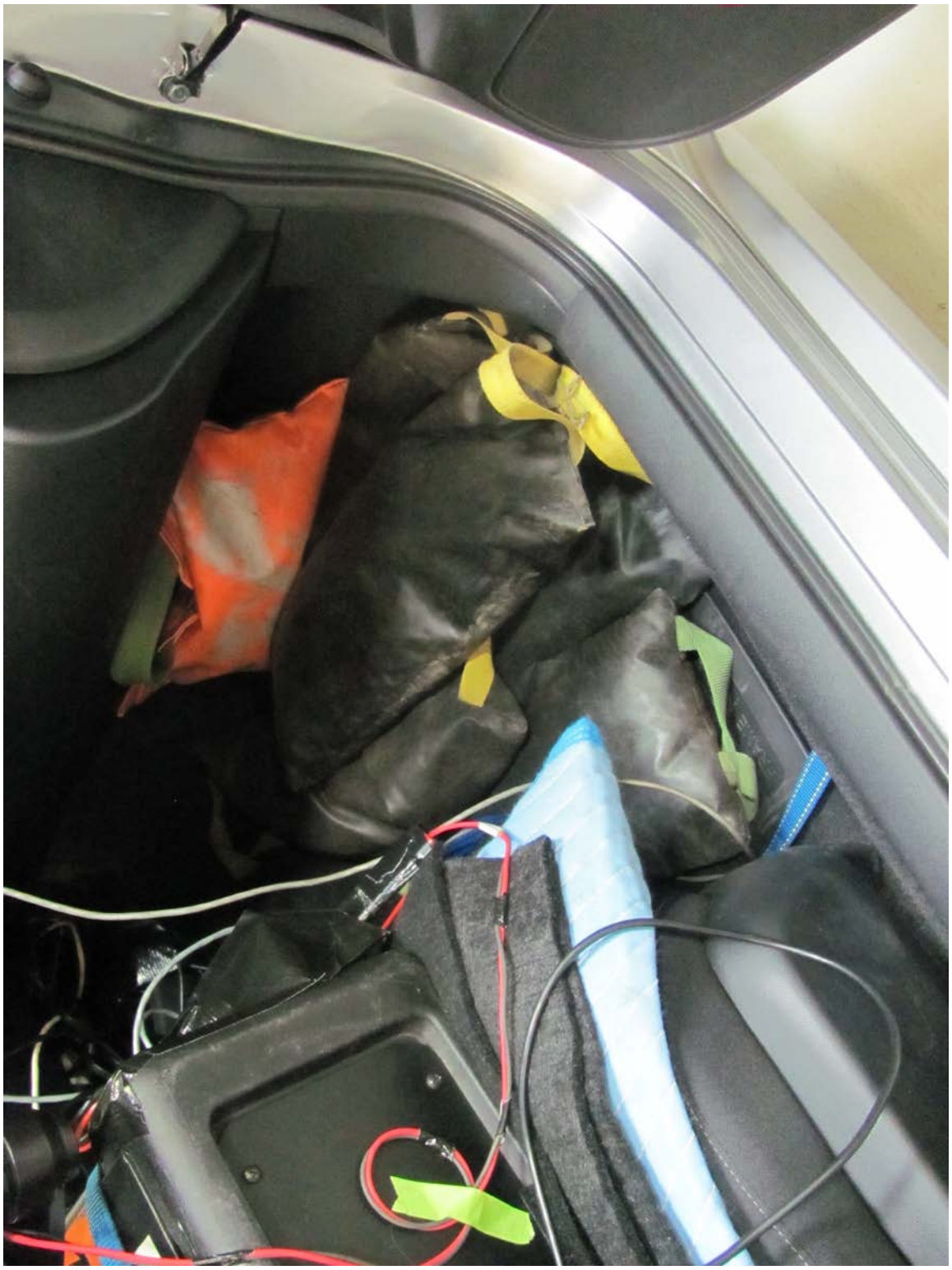
Test Instrumentation in Vehicle

Test Instrumentation in Vehicle




Test Instrumentation in Vehicle


Vehicle Being Weighed

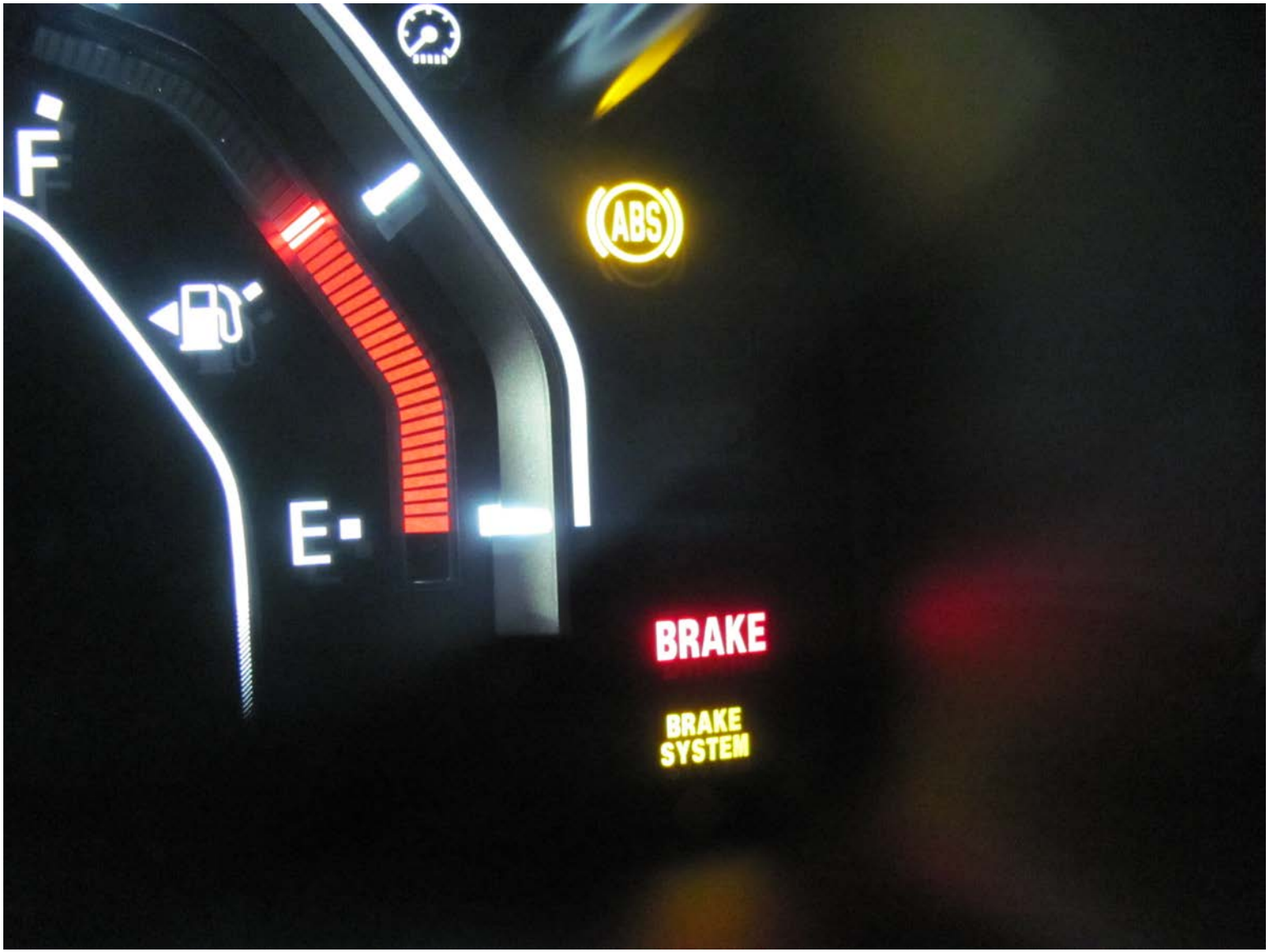


Ballast in Vehicle

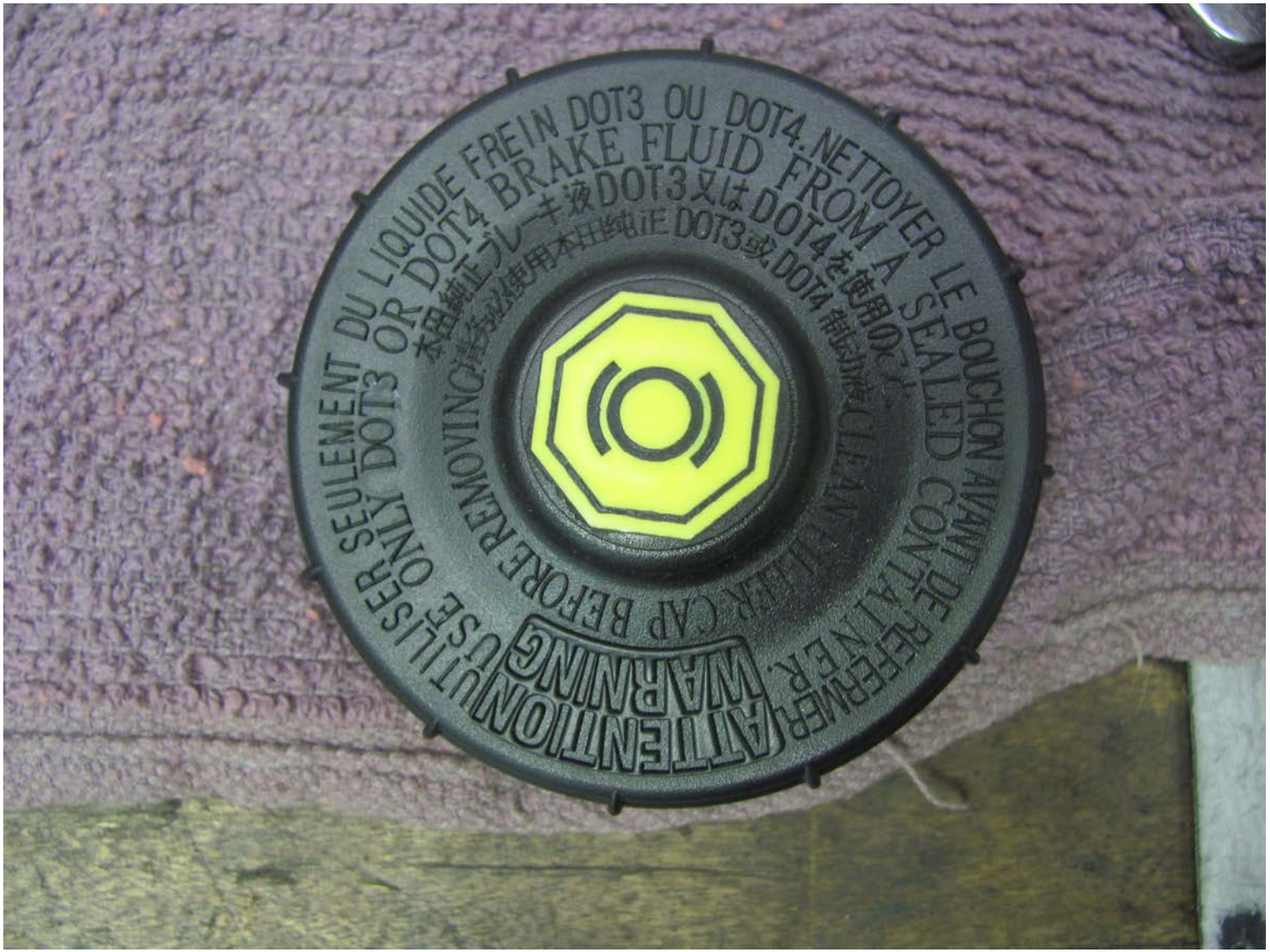
Ballast in Vehicle


Ballast in Vehicle

Ballast in Vehicle




BRAKE & ABS Indicator (Warning) Lamp




Brake System Reservoir Warning (Top of Cap)

## 6.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

A calibration report is included here that documents the instrumentation used on this test and the calibration dates.

| Manufacturer | Model | Serial | Calibration Date | Calibration Due |
|---|---|---|---|---|
| National Instruments | NI cDAQ-9172 | DAS-13FBEE4 | 12/1/2016 | 12/1/2017 |
| GSE | Pedal Force Trans. | SN-981734 | Each Test | Each Test |
| Fisher Scientific | Stopwatch | SW-101845032 | 10/17/2016 | 10/17/2017 |
| Fisher Scientific | Stopwatch | SW-97216633 | 8/8/2016 | 8/8/2017 |
| McDaniel Controls | Tire Pressure Gauge | AG-151 | 12/21/2016 | 6/21/2017 |
| Imada | Digital Force Gauge | OE-173727 | 9/6/2016 | 9/6/2017 |
| Ohaus | Asst. Pipe-Handle Steel Weights | LB-0001 | 7/7/2016 | 7/7/2017 |
| Setra | 141a | A-849724 | Each Test | Each Test |
| Racelogic | VBSS100 | SpdBX-025115 | Each Test | Each Test |
| Davis | 6410 | WX-A70406D36D | 2/15/2017 | 2/15/2018 |
| Davis | 6152 | WX-A70406D36D | 2/15/2017 | 2/15/2018 |
| Temprel/NI | LF Brake Thermocouple | T52-0B-24K | Ea. Test w/NI | Ea. Test w/NI |
| Temprel/NI | RF Brake Thermocouple | T52-0B-24K | Ea. Test w/NI | Ea. Test w/NI |
| Temprel/NI | LR Brake Thermocouple | T52-0B-24K | Ea. Test w/NI | Ea. Test w/NI |
| Temprel/NI | RR Brake Thermocouple | T52-0B-24K | Ea. Test w/NI | Ea. Test w/NI |
| Toledo/Mettler Scales | JAGXTREME 3000000 | SN 5225831-5JC | 2/9/2017 | 5/30/2017 |

Driver: D. Bevis/T. Rice
Observer: None
Recorded Data Processed by: Derek Bevis
Date:5/3/2017
Approving Laboratory Official: David Karls

## Instrumentation Calibration (1 of 3)

| | |
|---|---|
| Year | 2017 |
| Make & Model | Honda Civic |
| Unit Number | C20175304 |

**Accelerometer (Decel)**

Pre-Test Linearity Check

| Date | 4/18/2017 |
|---|---|
| Actual (m/s/s) | Rec. (m/s/s) |
| 0.0 | 0.0 |
| 3.0 | 3.0 |
| 6.1 | 6.1 |
| 9.8 | 9.8 |

Daily Calibration Check
Level to zero, then tilt 90 degrees for full scale
Desired full scale value is: 9.81 m/s/s
Allowed deviation is: +/- 0.15 m/s/s

| Date | Time | Zero | Cal | |
|---|---|---|---|---|
| 4/18/2017 | 2:42 PM | 0.00 | 9.80 | Pre-Test |
| 4/21/2017 | 1:55 PM | 0.00 | 9.80 | |
| 4/24/2017 | 9:10 AM | 0.00 | 9.80 | |
| 4/25/2017 | 8:25 AM | 0.00 | 9.80 | |
| 4/26/2017 | 8:55 AM | 0.00 | 9.80 | |
| 4/27/2017 | 9:10 AM | 0.00 | 9.80 | |
| 4/27/2017 | 11:28 AM | 0.00 | 9.80 | Post-Test |

Post-Test Linearity Check

| Date | 4/27/2017 |
|---|---|
| Actual (m/s/s) | Rec. (m/s/s) |
| 0.0 | 0.0 |
| 3.0 | 3.0 |
| 6.1 | 6.1 |
| 9.8 | 9.8 |

**Service Brake Pedal Force**

Pre-Test Linearity Check

| Date | 4/18/2017 |
|---|---|
| Actual Force (N) | Recorded Force (N) |
| 0 | 0 |
| 222 | 222 |
| 445 | 445 |
| 498 | 498 |

Post-Test Linearity Check

| Date | 4/27/2017 |
|---|---|
| Actual Force (N) | Recorded Force (N) |
| 0 | 0 |
| 222 | 221 |
| 445 | 444 |
| 498 | 497 |

## Instrumentation Calibration (2 of 3)

| | |
|---|---|
| Year | 2017 |
| Make & Model | Honda Civic |
| Unit Number | C20175304 |

**Distance**

Drive on a measured kilometer
Desired full scale value is: 1000 m
Allowed deviation is: 3 m

| Date | Time | Distance | |
|---|---|---|---|
| 4/18/2017 | 2:44 PM | 1000.26 | Pre-Test |
| 4/21/2017 | 1:59 PM | 999.79 | |
| 4/24/2017 | 9:13 AM | 999.62 | |
| 4/25/2017 | 8:27 AM | 1000.19 | |
| 4/26/2017 | 8:58 AM | 999.91 | |
| 4/27/2017 | 9:13 AM | 999.9 | |
| 4/27/2017 | 11:30 AM | 1000.4 | Post-Test |

**Speed Sensor** Drive vehicle at a steady 100 km/h through a kilometer.
Desired time value is: 36 seconds
Allowed deviation is: +/- 0.5 seconds

| Date | Time | Time (sec.) | |
|---|---|---|---|
| 4/18/2017 | 2:45 PM | 36.14 | Pre-Test |
| 4/21/2017 | 2:02 PM | 36.09 | |
| 4/24/2017 | 9:16 AM | 35.81 | |
| 4/25/2017 | 8:29 AM | 35.88 | |
| 4/26/2017 | 9:00 AM | 35.83 | |
| 4/27/2017 | 9:15 AM | 35.92 | |
| 4/27/2017 | 11:33 AM | 36.00 | Post-Test |

## Instrumentation Calibration (3 of 3)

| | |
|---|---|
| Year | 2017 |
| Make & Model | Honda Civic |
| Unit Number | C20175304 |

**Wheel Speed** While stopped, verify all wheel speeds read "0".
Then travel at approximatley 15 km/h and assure wheel speeds match vehicle speed.

| | | Zero | | | | Match Vehicle Speed? | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | Time | LF | RF | LR | RR | LF | RF | LR | RR | |
| 4/21/2017 | 1:50 PM | Y | Y | Y | Y | Y | Y | Y | Y | Pre-Test |
| 4/24/2017 | 9:07 AM | Y | Y | Y | Y | Y | Y | Y | Y | |
| 4/25/2017 | 8:21 AM | Y | Y | Y | Y | Y | Y | Y | Y | |
| 4/26/2017 | 8:52 AM | Y | Y | Y | Y | Y | Y | Y | Y | |
| 4/27/2017 | 9:05 AM | Y | Y | Y | Y | Y | Y | Y | Y | |
| 4/27/2017 | 11:35 AM | Y | Y | Y | Y | Y | Y | Y | Y | Post-Test |

**Park Brake Force**

| | |
|---|---|
| Pedal | N/A |
| Lever | Yes |

Pre-Test

| Date | N/A |
|---|---|
| Actual Force (N) | Recorded Force (N) |
| 0 | |
| 222 | |
| 445 | |
| 498 | |

Note: 498 only used for Pedal

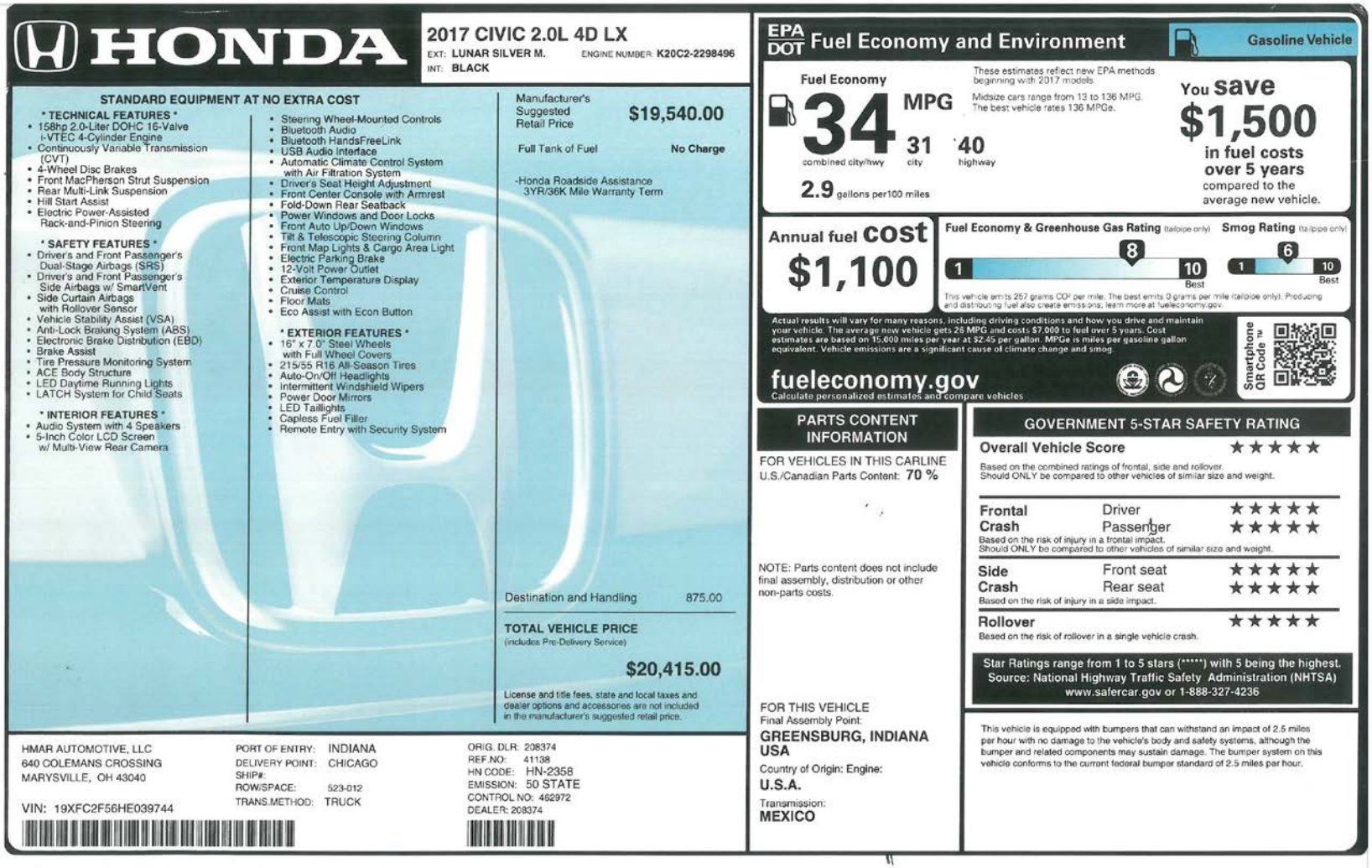
Post-Test

| Date | N/A |
|---|---|
| Actual Force (N) | Recorded Force (N) |
| 0 | |
| 222 | |
| 445 | |
| 498 | |

Note: 498 only used for Pedal

APPENDIX A

Copy of Manufacturer's Sticker



HONDA

2017 CIVIC 2.0L 4D LX

EXT: LUNAR SILVER M.
INT: BLACK

ENGINE NUMBER: K20C2-2298496

STANDARD EQUIPMENT AT NO EXTRA COST

* TECHNICAL FEATURES *
- 158hp 2.0-Liter DOHC 16-Valve i-VTEC 4-Cylinder Engine
- Continuously Variable Transmission (CVT)
- 4-Wheel Disc Brakes
- Front MacPherson Strut Suspension
- Rear Multi-Link Suspension
- Hill Start Assist
- Electric Power-Assisted Rack-and-Pinion Steering

* SAFETY FEATURES *
- Driver's and Front Passenger's Dual-Stage Airbags (SRS)
- Driver's and Front Passenger's Side Airbags w/ SmartVent
- Side Curtain Airbags with Rollover Sensor
- Vehicle Stability Assist (VSA)
- Anti-Lock Braking System (ABS)
- Electronic Brake Distribution (EBD)
- Brake Assist
- Tire Pressure Monitoring System
- ACE Body Structure
- LED Daytime Running Lights
- LATCH System for Child Seats

* INTERIOR FEATURES *
- Audio System with 4 Speakers
- 5-Inch Color LCD Screen w/ Multi-View Rear Camera
- Steering Wheel-Mounted Controls
- Bluetooth Audio
- Bluetooth HandsFreeLink
- USB Audio Interface
- Automatic Climate Control System with Air Filtration System
- Driver's Seat Height Adjustment
- Front Center Console with Armrest
- Fold-Down Rear Seatback
- Power Windows and Door Locks
- Front Auto Up/Down Windows
- Tilt & Telescopic Steering Column
- Front Map Lights & Cargo Area Light
- Electric Parking Brake
- 12-Volt Power Outlet
- Exterior Temperature Display
- Cruise Control
- Floor Mats
- Eco Assist with Econ Button

* EXTERIOR FEATURES *
- 16" x 7.0" Steel Wheels with Full Wheel Covers
- 215/55 R16 All-Season Tires
- Auto-On/Off Headlights
- Intermittent Windshield Wipers
- Power Door Mirrors
- LED Taillights
- Capless Fuel Filler
- Remote Entry with Security System

Manufacturer's Suggested Retail Price $19,540.00

Full Tank of Fuel No Charge

-Honda Roadside Assistance
3YR/36K Mile Warranty Term

Destination and Handling 875.00

TOTAL VEHICLE PRICE
(includes Pre-Delivery Service)

$20,415.00

License and title fees, state and local taxes and dealer options and accessories are not included in the manufacturer's suggested retail price.

HMAR AUTOMOTIVE, LLC
640 COLEMANS CROSSING
MARYSVILLE, OH 43040

VIN: 19XFC2F56HE039744

PORT OF ENTRY: INDIANA
DELIVERY POINT: CHICAGO
SHIP#:
ROW/SPACE: 523-012
TRANS.METHOD: TRUCK

ORIG. DLR: 208374
REF.NO: 41138
HN CODE: HN-2358
EMISSION: 50 STATE
CONTROL NO: 462972
DEALER: 208374

EPA DOT Fuel Economy and Environment

Gasoline Vehicle

Fuel Economy
34 MPG
combined city/hwy
31 city
40 highway
2.9 gallons per100 miles

These estimates reflect new EPA methods beginning with 2017 models.
Midsize cars range from 13 to 136 MPG.
The best vehicle rates 136 MPGe.

You save $1,500 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost $1,100

Fuel Economy & Greenhouse Gas Rating (tailpipe only) 8 (1 – 10, Best)

Smog Rating (tailpipe only) 6 (1 – 10, Best)

This vehicle emits 257 grams $CO_2$ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 26 MPG and costs $7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $2.45 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

Smartphone QR Code™

fueleconomy.gov
Calculate personalized estimates and compare vehicles

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE
U.S./Canadian Parts Content: 70 %

NOTE: Parts content does not include final assembly, distribution or other non-parts costs.

FOR THIS VEHICLE
Final Assembly Point:
GREENSBURG, INDIANA USA
Country of Origin: Engine:
U.S.A.
Transmission:
MEXICO

GOVERNMENT 5-STAR SAFETY RATING

Overall Vehicle Score ★★★★★
Based on the combined ratings of frontal, side and rollover.
Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash — Driver ★★★★★ — Passenger ★★★★★
Based on the risk of injury in a frontal impact.
Should ONLY be compared to other vehicles of similar size and weight.

Side Crash — Front seat ★★★★★ — Rear seat ★★★★★
Based on the risk of injury in a side impact.

Rollover ★★★★★
Based on the risk of rollover in a single vehicle crash.

Star Ratings range from 1 to 5 stars (*****) with 5 being the highest.
Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

This vehicle is equipped with bumpers that can withstand an impact of 2.5 miles per hour with no damage to the vehicle's body and safety systems, although the bumper and related components may sustain damage. The bumper system on this vehicle conforms to the current federal bumper standard of 2.5 miles per hour.

APPENDIX B

Discussion on Data

DISCUSSION ON DATA

Symbols for Brake Components

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4 | - | 4 Wheel | G | - | Groan | DL | - | Deceleration (State FPSPS) |
| X | - | Skid | SQ | - | Squeal | PF | - | Pedal on Floor |
| L | - | Left | SQK | - | Squeak | SCP | - | Shoe Scrape |
| R | - | Right | PO | - | Pinchout | RB | - | Rubber Banding |
| R | - | Rear | P | - | Pull | O | - | Odor |
| F | - | Front | R | - | Shudder | NOX | - | No Skid |
| B | - | Both | M | - | Momentary | | | |

| | | |
|---|---|---|
| INT or INIT | - | Initial Part of Stop |
| MID | - | Middle of Stop |
| END | - | End of Stop |

All stops were made manually.

APPENDIX C

Contractor's Comments
Procedure Modifications
and
Test Facility

Comments for vehicle C20175304.

For all recorded decelerations:

The recorded *average* deceleration values for the tests are slightly lower than that which is required or targeted for certain test sections. However, in all cases and in reality, the driver maintained the correct required/target deceleration values for the majority of time for each of those stops. The recorded deceleration is acquired from the moment the service brake pedal is moved until the vehicle reaches zero speed. Therefore, the time needed to achieve the target deceleration (rise time) and the time the vehicle goes from the target deceleration to zero (fall time) is included in the average deceleration calculation. The rise and fall times were added to the entire length of the stops. Hence, the recorded average deceleration values were generally and slightly less than the required/target deceleration values.

For Antilock Functional Failures, the “ABS” and traction control lamps alighted. ABS failure was induced by disconnecting the LF ABS sensor.

The Hydraulic Circuit Failure Tests were performed not to the lab procedure sequence to both save time and cause minimal disruption to the hydraulic brake system. Sequence: Circuit #1 @ LLVW; Circuit #2 @ LLVW: Circuit #2 @ GVWR and Circuit #1 @ GVWR.

## 7.5-MILE TEST TRACK

The 7.5-mile test track encloses a 1,600-acre area, one mile wide and 3.5 miles long.

The track has a downward grade, north to south, of 0.228 percent and a cross slope in the straight-aways of 3/16 inch per foot. The 1.88 mile long straight-aways flow into transition areas 2,300 feet in length and then into 5,275-foot long curves with a constant radius of 2,400 feet. The 36-foot wide straight-aways and the 42-foot wide curves provide three test lanes. 12 foot berms border the straight-aways and the inside of the curves.

As a vehicle moves toward the outside of the track in the curves, it encounters a progressively steeper bank. The inside lane (or "slow" lane) has a bank of 10 degrees allowing a neutral speed of 80 mph with no side forces. In the center lane, the slope increases to 19 degrees resulting in a neutral speed of 110 mph. The outside lane's 28-degree bank allows a 140 mph neutral speed. Rimming the outer lane is a seven-foot safety lane culminating in a 36-degree slope at the guardrail.

The facility is paved with asphalt. It carries a maximum single axle load of 36,000 pounds and a maximum tandem axle load weight of 48,000 pounds. Special provisions can be made for heavier weight loads.

With 22.5 lane miles, our track will accommodate many vehicles simultaneously. Research which utilizes the track includes component performance and durability studies, brake tests, aerodynamic studies, fuel economy studies, drive line efficiency tests, and the determination of vehicular acceleration and cruise characteristics. In addition, it supports maximum speed determination, road load power, noise and emission measurements and tire durability test programs.

The 7.5-mile test track can be used in conjunction with other facilities at TRC. It provides an excellent area for pre-test conditioning of equipment such as brake burnishing, tire break-in, and vehicle warm-up.

## TRC SKID PAD

The Skid Pad is a test facility which is utilized primarily for the evaluation of tire and brake systems.

The overall dimensions of the pad are 9,000 feet by 84 feet with loops on the north and south ends. Both turnaround loops have a 309-foot radius and are 16 feet wide with a 25 percent super elevation. They will accommodate speeds of 45 mph with zero side force and 60 mph with .5 g's lateral acceleration. The acceleration/deceleration lanes at each end are 3,280 feet in length.

A test area of 210,000 square feet is situated in the center of the skid pad containing several test pads with varying surface textures. Skid numbers in this area range from 30 (wet) to mid 80s (dry). Dry Peaks are in the upper 90's.

The skid pad is paved with Portland cement. The load capacity of the skid pad is 36,000 pounds maximum single axle weight and 48,000 pounds maximum tandem axle weight.