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Date: 7/30/2010

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Date: 7/30/2010

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COTR, Rear Impact

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16. Abstract
A rear impact was conducted on a 2010 Ford Transit Connect at MGA Research Corporation on July 26, 2010. This test was conducted to obtain data indicant of FMVSS 301R. The impact velocity was 79.6 km/h. The ambient temperature at the time of impact was 29 degrees Celsius.

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<td>A</td>
</tr>
</tbody>
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SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This rear impact test is sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-06-C-00030. The purpose of this test is to reduce deaths and injuries occurring from fires that result from fuel spillage during and after motor vehicle crashes and resulting from ingestion of fuels during siphoning.

SUMMARY

A 2010 Ford Transit Connect was impacted by a Moving Deformable Barrier (MDB) at a velocity of 79.6 km/h. The test was performed at MGA Research Corporation on July 26, 2010. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and four high-speed cameras were used to document the impact event.

- Left Rear Half 1000 fps
- Right Rear Half 1000 fps
- Overhead Overall 1000 fps
- Right Overall 1000 fps
- Real Time Pan 30 fps

Two ballast Part 572E, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The vehicle appeared to comply with all the requirements of FMVSS No. 301 “Fuel System Integrity.”
DATA SHEET NO. 1
TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2010 Ford Transit Connect  
NHTSA No.: CA0214
Test Program: FMVSS 301 Fuel System Integrity  
Test Date: 7/26/2010

TEST VEHICLE INFORMATION

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Ford Motor Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Transit Connect</td>
</tr>
<tr>
<td>Body Style</td>
<td>Truck</td>
</tr>
<tr>
<td>Major Options</td>
<td>None</td>
</tr>
<tr>
<td>NHTSA No.</td>
<td>CA0214</td>
</tr>
<tr>
<td>VIN</td>
<td>NM0KS9BNXAT017711</td>
</tr>
<tr>
<td>Color</td>
<td>Frozen White</td>
</tr>
<tr>
<td>Delivery Date</td>
<td>7/20/2010</td>
</tr>
<tr>
<td>Odometer Reading (mile)</td>
<td>307</td>
</tr>
<tr>
<td>Dealer</td>
<td>De Lacy Ford Inc.</td>
</tr>
<tr>
<td>Transmission</td>
<td>Automatic</td>
</tr>
<tr>
<td>Final Drive</td>
<td>Front Wheel Drive</td>
</tr>
<tr>
<td>Number of Cylinders</td>
<td>4</td>
</tr>
<tr>
<td>Engine Displacement (L)</td>
<td>2.0</td>
</tr>
<tr>
<td>Engine Placement</td>
<td>Lateral</td>
</tr>
</tbody>
</table>

DATA FROM VEHICLE’S CERTIFICATION LABEL

<table>
<thead>
<tr>
<th>Manufactured By</th>
<th>Ford Motor Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Manufacture</td>
<td>09/09</td>
</tr>
<tr>
<td>GVWR (kg)</td>
<td>2252</td>
</tr>
<tr>
<td>GAWR Front (kg)</td>
<td>1128</td>
</tr>
<tr>
<td>GAWR Rear (kg)</td>
<td>1239</td>
</tr>
</tbody>
</table>

VEHICLE CAPACITY DATA

<table>
<thead>
<tr>
<th>Measured Parameter</th>
<th>Front</th>
<th>Rear</th>
<th>Third</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Seats</td>
<td>Bucket</td>
<td>Split Bench</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Occupants</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Capacity Wt. (VCW) (kg)</td>
<td></td>
<td></td>
<td></td>
<td>647</td>
</tr>
<tr>
<td>Number of Occupants x 68 kg.</td>
<td></td>
<td></td>
<td></td>
<td>340</td>
</tr>
<tr>
<td>Cargo Wt. (RCLW) (kg)</td>
<td></td>
<td></td>
<td></td>
<td>307</td>
</tr>
</tbody>
</table>
### DATA FROM VEHICLE’S TIRE PLACARD

<table>
<thead>
<tr>
<th>Measured Parameter</th>
<th>Front</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Tire Pressure (kPa)</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>Cold Pressure (kPa)</td>
<td>250</td>
<td>340</td>
</tr>
<tr>
<td>Recommended Tire Size</td>
<td>P205/65R15</td>
<td>P205/65R15</td>
</tr>
<tr>
<td>Recommended Load Range</td>
<td>95T</td>
<td>95T</td>
</tr>
<tr>
<td>Tire Size on Vehicle</td>
<td>P205/65R15</td>
<td>P205/65R15</td>
</tr>
<tr>
<td>Tire Manufacturer</td>
<td>Continental</td>
<td>Continental</td>
</tr>
<tr>
<td>Location of Placard of Vehicle</td>
<td>Lower B-Post</td>
<td></td>
</tr>
<tr>
<td>Type of Spare Tire (full size/space saver)</td>
<td>Space Saver</td>
<td></td>
</tr>
</tbody>
</table>
## DATA SHEET NO. 2
### PRE-TEST DATA

Test Vehicle: 2010 Ford Transit Connect  
NHTSA No.: CA0214  
Test Program: FMVSS 301 Fuel System Integrity  
Test Date: 7/26/2010

### WEIGHT OF TEST VEHICLE

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>As Delivered (UVW) (Axle)</th>
<th>As Tested (ATW) (Axle)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Front</td>
<td>Rear</td>
</tr>
<tr>
<td>Left</td>
<td>kg</td>
<td>439.5</td>
<td>357.9</td>
</tr>
<tr>
<td>Right</td>
<td>kg</td>
<td>435.9</td>
<td>347.0</td>
</tr>
<tr>
<td>Ratio</td>
<td>%</td>
<td>55.4</td>
<td>44.6</td>
</tr>
<tr>
<td>Totals</td>
<td>kg</td>
<td>875.4</td>
<td>704.9</td>
</tr>
</tbody>
</table>

### CALCULATION OF TARGET TEST WEIGHT (TTW)

<table>
<thead>
<tr>
<th>Measured Parameter</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Delivered Weight (UVW)</td>
<td>kg</td>
<td>1580.3</td>
</tr>
<tr>
<td>Rated Cargo/Luggage Weight (RCLW)</td>
<td>kg</td>
<td>136</td>
</tr>
<tr>
<td>Weight of 2 P572E ATDs</td>
<td>kg</td>
<td>148</td>
</tr>
<tr>
<td>Calculated Vehicle Target Weight (TVTW)</td>
<td>kg</td>
<td>1864.3</td>
</tr>
</tbody>
</table>

| Vehicle Wheelbase                           | 2914 mm       |
| Vehicle Width                               | 1785 mm       |
| Weight of Ballast Secured in Rear Seat      | 132 kg        |
| Method of Securing Ballast                  | Ratchet Straps|
| Vehicle Components Removed for Weight Reduction | None          |

### VEHICLE ATTITUDES

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>LF</th>
<th>RF</th>
<th>LR</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>As Delivered mm</td>
<td>718</td>
<td>710</td>
<td>781</td>
<td>785</td>
<td></td>
</tr>
<tr>
<td>As Tested mm</td>
<td>695</td>
<td>692</td>
<td>765</td>
<td>769</td>
<td></td>
</tr>
</tbody>
</table>
## DATA SHEET NO. 2 (continued)
### PRE-TEST DATA

<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2010 Ford Transit Connect</th>
<th>NHTSA No.:</th>
<th>CA0214</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Program:</td>
<td>FMVSS 301 Fuel System Integrity</td>
<td>Test Date:</td>
<td>7/26/2010</td>
</tr>
</tbody>
</table>

### FUEL SYSTEM DATA

<table>
<thead>
<tr>
<th>Description</th>
<th>Units: Liters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usable Capacity of “Standard Tank” (Owner's Manual)</td>
<td>58.3</td>
</tr>
<tr>
<td>Usable Capacity Figure Furnished by COTR</td>
<td>58.3</td>
</tr>
<tr>
<td>Usable Capacity of “Optional” Tank</td>
<td></td>
</tr>
<tr>
<td>92-94% of Usable Capacity</td>
<td>53.6 to 54.8</td>
</tr>
<tr>
<td>Actual Test Volume (entire fuel system filled)</td>
<td>54.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Fluid Type</th>
<th>Stoddard Solvent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Fluid Kinematic Viscosity (centistokes)</td>
<td>2.1 cSt @ 20° C</td>
</tr>
<tr>
<td>Test Fluid Color</td>
<td>Purple</td>
</tr>
<tr>
<td>Type of Vehicle Fuel Pump</td>
<td>Electrical</td>
</tr>
<tr>
<td>Activate Electric Fuel Pump Operation with Ignition Switch ON, but Engine OFF</td>
<td>Yes</td>
</tr>
</tbody>
</table>

| Comments (noticeable attributes of fuel system components, capacity, etc.) | None |
# DATA SHEET NO. 3
## MOVING BARRIER DATA

**Test Vehicle:** 2010 Ford Transit Connect  
**NHTSA No.:** CA0214  
**Test Program:** FMVSS 301 Fuel System Integrity  
**Test Date:** 7/26/2010

### MOVING BARRIER’S TEST WEIGHT

<table>
<thead>
<tr>
<th>Units</th>
<th>Front</th>
<th>Rear</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>kg</td>
<td>374.2</td>
<td>308.8</td>
</tr>
<tr>
<td>Right</td>
<td>kg</td>
<td>389.5</td>
<td>291.2</td>
</tr>
<tr>
<td>Ratio</td>
<td>%</td>
<td>56.0</td>
<td>44.0</td>
</tr>
<tr>
<td>Totals</td>
<td>kg</td>
<td>763.7</td>
<td>600.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tires (Mfr, line, size)</th>
<th>Yokohama</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tire Pressure (kPa)</td>
<td>207</td>
</tr>
<tr>
<td>Brake Abort System (Yes/No)?</td>
<td>Yes</td>
</tr>
<tr>
<td>Date of Last Calibration</td>
<td>8/6/2008</td>
</tr>
</tbody>
</table>
DATA SHEET NO. 4
POST-TEST DATA

Test Vehicle: 2010 Ford Transit Connect  
NHTSA No.: CA0214  
Test Program: FMVSS 301 Fuel System Integrity  
Test Date: 7/26/2010

<table>
<thead>
<tr>
<th>IMPACT VELOCITY</th>
<th>Units: km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Impact Velocity</td>
<td>80.0</td>
</tr>
<tr>
<td>Actual Impact Velocity (Trap No. 1)</td>
<td>79.6</td>
</tr>
<tr>
<td>Actual Impact Velocity (Trap No. 2)</td>
<td>79.6</td>
</tr>
<tr>
<td>Average Impact Speed</td>
<td>79.6</td>
</tr>
</tbody>
</table>

| Temperature at Time of Impact (°C) | 29 |
| Test Time | 11:08 am |

<table>
<thead>
<tr>
<th>WELDING ROD IMPACT POINT</th>
<th>Units: mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical distance from target center (+ above target / - below target)</td>
<td>3 down</td>
</tr>
<tr>
<td>Horizontal distance from target center (+ to the right / - to the left)</td>
<td>8 left</td>
</tr>
</tbody>
</table>
DATA SHEET NO. 5
STATIC ROLLOVER TEST DATA

Test Vehicle: 2010 Ford Transit Connect  
NHTSA No.: CA0214  
Test Program: FMVSS 301 Fuel System Integrity  
Test Date: 7/26/2010

STODDARD SOLVENT SPILLAGE MEASUREMENT

A. From impact until vehicle motion ceases: 0 g  
(Maximum Allowable = 28 grams)

B. For the 5 minute period after motion ceases: 0 g  
(Maximum Allowable = 28 grams)

C. For the following 25 minutes: 0 g  
(Maximum Allowable = 28 grams/minute)

D. Spillage: None

FMVSS 301 STATIC ROLLOVER DATA

1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

3. Details of Stoddard Solvent spillage locations: Not Applicable
**DATA SHEET NO. 5 (continued)**

**STATIC ROLLOVER TEST DATA**

Test Vehicle: 2010 Ford Transit Connect  
NHTSA No.: CA0214  
Test Program: FMVSS 301 Fuel System Integrity  
Test Date: 7/26/2010

**STODDARD SOLVENT SPILLAGE MEASUREMENT**  
Hold Time = 5 minutes at all intervals

<table>
<thead>
<tr>
<th>Test Phase</th>
<th>Spillage (g)</th>
<th>Spillage Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 5 minutes from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sixth minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Seventh minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Eight minute if required</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

0° TO 90° Rotation Time (sec) = 118 sec

<table>
<thead>
<tr>
<th>Test Phase</th>
<th>Spillage (g)</th>
<th>Spillage Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 5 minutes from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sixth minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Seventh minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Eight minute if required</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

90° TO 180° Rotation Time (sec) = 116 sec

<table>
<thead>
<tr>
<th>Test Phase</th>
<th>Spillage (g)</th>
<th>Spillage Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 5 minutes from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sixth minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Seventh minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Eight minute if required</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

180° TO 270° Rotation Time (sec) = 114 sec

<table>
<thead>
<tr>
<th>Test Phase</th>
<th>Spillage (g)</th>
<th>Spillage Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 5 minutes from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sixth minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Seventh minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Eight minute if required</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

270° TO 360° Rotation Time (sec) = 114 sec

<table>
<thead>
<tr>
<th>Test Phase</th>
<th>Spillage (g)</th>
<th>Spillage Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 5 minutes from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sixth minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Seventh minute from onset of rotation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Eight minute if required</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
NORMAL DESIGN RIDING POSITION

With the seat in the mid fore-aft seat track position the angle of the driver’s seat back when it is in the nominal riding position is set at 25.8 degrees.

<table>
<thead>
<tr>
<th>Driver Seat Back Angle</th>
<th>25.8°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger Seat Back Angle</td>
<td>25.8°</td>
</tr>
</tbody>
</table>

SEAT FORE/AFT POSITIONING

<table>
<thead>
<tr>
<th></th>
<th>Total Fore/Aft Travel</th>
<th>Placed in Position #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Seat</td>
<td>289 mm</td>
<td>145 mm</td>
</tr>
<tr>
<td>Passenger Seat</td>
<td>220 mm</td>
<td>110 mm</td>
</tr>
</tbody>
</table>

D-RING ADJUSTMENT

The driver and passenger D-rings were placed full up.

STEERING COLUMN ADJUSTMENT

The steering column was placed in the mid position.
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Photo No. 36. Post-Test Top View of MDB
Photo No. 37. Static Rollover at 90 Degrees
Photo No. 38. Static Rollover at 180 Degrees
Photo No. 39. Static Rollover at 270 Degrees
Photo No. 40. Static Rollover at 360 Degrees
Vehicle's Certification Label

MFD. BY FORD MOTOR CO.

DATE: 09/09  GVWR: 4965LB/2252KG
FRONT GAWR: 2486LB  REAR GAWR: 2732LB
/1128KG  /1239KG
P205/65R15 95T  P205/65R15 95T
RIMS  RIMS
15X6J  15X6J
AT 250kPA/36PSI COLD  AT 340kPA/50PSI COLD

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE

VIN: NM0KS9BNXAT017711
TYPE: TRUCK

EXT PNT: Z2
WB 2912  INT TR 8K  ETU  R 4  TR 2  SPR DDGG

9T16-1520472-AA
Vehicle's Tire Placard

**TIRE AND LOADING INFORMATION**

RENSEIGNEMENTS SUR LES PNEUS ET LE CHARGEMENT

**SEATING CAPACITY / NOMBRE DE PLACES**

<table>
<thead>
<tr>
<th>TOTAL</th>
<th>FRONT</th>
<th>REAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

The combined weight of occupants and cargo should never exceed
Le poids total des occupants et du chargement ne doit jamais dépasser:

| TOTAL | 647 kg or 1428 lbs. |

<table>
<thead>
<tr>
<th>TIRE PNEU</th>
<th>SIZE DIMENSIONS</th>
<th>COLD TIRE PRESSURE PRESSION DES PNEUS À FROID</th>
<th>SEE OWNERS MANUAL FOR ADDITIONAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT/AVANT</td>
<td>P205/65R15 95T</td>
<td>250KPA, 36PSI</td>
<td>VOIR LE MANUEL DE L'USAGER POUR PLUS DE RENSEIGNEMENTS</td>
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<tr>
<td>REAR/ARRIERE</td>
<td>P205/65R15 95T</td>
<td>340KPA, 49PSI</td>
<td></td>
</tr>
<tr>
<td>SPARE/DE SECOURS</td>
<td>P205/65R15 95T</td>
<td>340KPA, 49PSI</td>
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</tbody>
</table>
Post-Test Front View of Vehicle
Post-Test Left Side View of Vehicle
Pre-Test Left Rear Close-up View of Vehicle
Post-Test Left Rear Close-up View of Vehicle
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