

# FEDERAL TRANSIT BUS TEST

Performed for the Federal Transit Administration U.S. DOT  
In accordance with 49 CFR, Part 665

## Altoona Bus Testing and Research Center Test Bus Procedure

### 5.4 STRUCTURAL STRENGTH AND DISTORTION TESTS – DYNAMIC TOWING TEST

Pass/Fail  
October 2016



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## ABBREVIATIONS

ABTC	Altoona Bus Test Center
A/C	Air Conditioner
ADB	Advance design bus
CBD	Central business district
CI	Compression ignition
CNG	Compressed natural gas
CW	Curb weight (bus weight including maximum fuel, oil, and coolant; but without passengers or driver)
dB(A)	Decibels with reference to 0.0002 microbar as measured on the “A” scale
DIR	Test director
DR	Bus driver
EPA	Environmental Protection Agency
FFS	Free floor space (floor area available to standees, excluding ingress/egress areas, area under seats, area occupied by feet of seated passengers, and the vestibule area)
FTA	Federal Transit Administration
GAWR	Gross axle weight rating
GL	Gross load (150 lb. for every designed passenger seating position, for the driver, and for each 1.5 sq. ft. of free floor space)
GVW	Gross vehicle weight (curb weight plus gross vehicle load)
GVWR	Gross vehicle weight rating
hr.	Hour
LNG	Liquefied natural gas
LTI	Lawson Transportation Institute
mpg	Miles per gallon
mph	Miles per hour
NBM	New bus models
PSTT	Penn State Test Track
rpm	Revolutions per minute
SAE	Society of Automotive Engineers
SCF	Standard cubic feet
SCFM	Standard cubic feet per minute
SCH	Test scheduler
SA	Staff Assistant
SI	Spark ignition
SLW	Seated load weight (curb weight plus 150 lb. for every designated passenger seating position and for the driver)
TD	Test driver
TM	Track manager
TP	Test personnel

### **5.4-I. TEST OBJECTIVE**

The objective of this test is to verify the integrity of the towing fixtures and determine the feasibility of the towing the bus using a heavy-duty wrecker and specified procedures.

### **5.4-II. TEST DESCRIPTION**

This test requires the bus to be towed at curb weight using a heavy-duty wrecker and the specified equipment and instructions provided by the manufacturer. The bus will be towed for approximately 5 miles at a speed of approximately 20 mph for each recommended towing configuration. After releasing the bus from the wrecker, the bus will be visually inspected for any structural damage or permanent deformation. All doors, windows and passenger escape mechanisms will be inspected for proper operation.

### **5.4-III. TEST ARTICLE**

The test article is a transit bus with a minimum service life of 4, 5, 7, 10 or 12 years.

### **5.4-IV. TEST EQUIPMENT/FACILITIES/PERSONNEL**

This test will be performed on the track at the PSTT. The following test equipment and personnel are required for this test:

1. Heavy-duty wrecker (contracted service)
2. Manufacturer supplied towing equipment
3. Test driver (TD)
4. Test personnel (TP)
5. Camera
6. Calibrated thermometer and wind speed indicator

### **5.4-V. TEST DATA**

The test data consists of the Dynamic Towing Test Data Form. All forms to be filled out with pen. Upon completion of this test, data shall be forwarded to the ABTC manager.

### **5.4-VI. TEST PREPARATION AND PROCEDURES**

Detailed test preparation and procedures are listed in Procedure 5.4-1. This section also includes Dynamic Towing Test Data Form – 5.4.

<b>DETAILED TEST PROCEDURES</b>		<b>TITLE: 5. Structural Integrity</b>
<b>Procedure 5.4-1</b>	<b>NOMENCLATURE: 5.4 Structural Strength and Distortion Tests – Dynamic Towing Test</b>	
<b>OPER STEP</b>	<b>ACTION BY</b>	<b>TEST PREPARATION AND PROCEDURE</b>
1	TP	Record bus number on the data form.
2	TP/TD	Attach provided towing fixture to test bus as specified per manufacturer's instructions. Note any difficulty on test data sheet. Photograph fixtures as attached (close-up).
3	TP/TD	Attach towing fixture to heavy-duty wrecker and, if required, raise the front wheels of the coach to a height suitable for towing. Note any difficulty on Dynamic Towing Test Data Form. Photograph bus prepared for towing (side view).
4	TP	Remove drive axle shafts or disconnect drive shaft as per manufacturer's recommendations. Ensure brakes are released as per manufacturer's recommendations before towing.
5	TD	Tow bus at a speed of approximately 20 mph for a total of five laps around bus test lane at PSTT.
6	TP	Repeat steps 2 through 5 for all other manufacturer recommended towing conditions
7	TP	Replace drive axle or reconnect drive shaft.
8	TD	Release bus from wrecker.
9	TP/TD	Visually inspect coach for structural damage or permanent deformation.
10	TP/TD	Operate all doors, windows, and escape mechanisms to verify normal operation. Record any malfunctions or damage on test data sheet.
11	TP	Upon completion of this test, data shall be forwarded to the ABTC manager.