

**SURFACE  
VEHICLE  
RECOMMENDED  
PRACTICE**

**SAE** J1143

REV.  
FEB94

Issued 1976-07  
Revised 1994-02

Superseding J1143 JUN91

Submitted for recognition as an American National Standard

**(R) TOWED VEHICLE/TOW EQUIPMENT ATTACHMENT TEST PROCEDURE—  
PASSENGER CARS, VANS, AND LIGHT-DUTY TRUCKS**

**Foreword**—This Document has also changed to comply with the new SAE Technical Standards Board Format. Definitions has been changed to Section 3.

**TABLE OF CONTENTS**

1.	Scope .....	1
2.	References .....	2
2.1	Applicable Publications.....	2
3.	Definitions.....	2
4.	Test Equipment.....	2
4.1	Tow Truck.....	2
4.2	Vehicle Ballast .....	2
4.3	Wheel Alignment Checking Device .....	2
5.	Test Procedure .....	2
5.1	Towed Vehicle Preparation .....	2
5.2	Front Towing Test Procedure.....	6
5.3	Rear Towing Test Procedure.....	7
6.	Notes .....	8
6.1	Marginal Indicia .....	8
6.2	Key Words .....	8

1. **Scope**—This SAE Recommended Practice provides a means to observe and evaluate a towed vehicle under a variety of road conditions to determine its behavior. The drivetrain should be evaluated by conducting SAE J1144.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

**QUESTIONS REGARDING THIS DOCUMENT: (724) 772-8512 FAX: (724) 776-0243  
TO PLACE A DOCUMENT ORDER; (724) 776-4970 FAX: (724) 776-0790  
SAE WEB ADDRESS <http://www.sae.org>**

**2. References**

**2.1 Applicable Publications**—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1142—Towability Design Criteria and Equipment Use—Passenger Cars, Vans, and Light-Duty Trucks

SAE J1144—Towed Vehicle Drivetrain Test Procedures—Passenger Cars, Vans, and Light-Duty Trucks

**3. Definitions**—See SAE J1142, 2.2.

**4. Test Equipment**

**4.1 Tow Truck**

4.1.1 TOW-SLING EQUIPMENT—PASSENGER CARS, VANS, AND LIGHT-DUTY TRUCKS BEING TOWED WITH TOW-SLING EQUIPMENT—The tow vehicle used will conform to the criteria set in SAE J1142, 3.2.1 through 3.2.3.1.

4.1.2 WHEEL-LIFT EQUIPMENT—PASSENGER CARS, VANS, AND LIGHT-DUTY TRUCKS BEING TOWED WITH WHEEL-LIFT EQUIPMENT—The tow vehicle used should conform to criteria set in SAE J1142, 3.3.1 through 3.3.3.

4.1.3 Additional towing equipment as necessary to safely tow the vehicle. See SAE J1142, 3.1 through 3.1.6.

4.1.4 Other equipment and information as required. See SAE J1142, Section 5.

**4.2 Vehicle Ballast**

**4.3 Wheel Alignment Checking Device**

**5. Test Procedure**

**5.1 Towed Vehicle Preparation**

NOTE—For recording purposes, use the applicable test data sheet (Figures 1 to 3).

5.1.1 The vehicle shall be at curb weight.

5.1.2 The tires shall be those with the smallest static-loaded radius available for the vehicle at the heaviest curb weight in 5.1.1.

5.1.3 The tire pressures shall be to vehicle manufacturer's lowest recommended pressure.

5.1.4 Optional equipment including, but not limited to, bumper guards, aero-skirting, automatic level control systems, which may affect tow equipment attachment and/or reduce towed vehicle ground clearance during towing, shall be installed.

5.1.5 The trim height shall be within the vehicle manufacturer's specifications prior to testing.

5.1.6 Check the front and rear wheel alignments, if applicable, and record on the test data sheet. Reset to vehicle manufacturer's specification, if required.

SAE J1143 Revised FEB94

Report No. \_\_\_\_\_

**Front Tow Test 5.2**

Record ground clearance to closest component (5.2.2) \_\_\_\_\_ mm (in)

Record ground clearance at rear of vehicle (5.2.2) \_\_\_\_\_ mm (in)

Results of visual inspection (sling vehicles only) after Curb Test (5.2.4 to 5.2.5)

\_\_\_\_\_  
\_\_\_\_\_

Results of visual inspection after Highway Frequency Vertical Shock Test (5.2.6 to 5.2.7)

\_\_\_\_\_  
\_\_\_\_\_

NOTE—If dolly was used, record how high lifted wheels were raised to compensate for dolly height

Results of visual inspection after Roll Test (5.2.8 to 5.2.9)

\_\_\_\_\_  
\_\_\_\_\_

Results of visual inspection after Pitch Test (5.2.10 to 5.2.11)

\_\_\_\_\_  
\_\_\_\_\_

Results of visual inspection after Highway Test (5.2.12 to 5.2.13)

\_\_\_\_\_  
\_\_\_\_\_

Results of visual inspection after Grade Test (5.2.14 to 5.2.15)

\_\_\_\_\_  
\_\_\_\_\_

Results of visual inspection (sling vehicles only) after Normal Brake Stop (5.2.16 to 5.2.17)

\_\_\_\_\_  
\_\_\_\_\_

Results of visual inspection (sling vehicles only) after Panic Brake Stop (5.2.18 to 5.2.19)

\_\_\_\_\_  
\_\_\_\_\_

Results of Final Inspection (5.2.20)

\_\_\_\_\_  
\_\_\_\_\_

Results of Road Test (5.2.21)

\_\_\_\_\_  
\_\_\_\_\_

FIGURE 1—TEST DATA SHEET 1 (FRONT TOW)

SAE J1143 Revised FEB94

Report No. \_\_\_\_\_

**Rear Tow Test 5.3**

Record ground clearance to closest component (5.3.2) \_\_\_\_\_ mm (in)

Record ground clearance at front of vehicle (5.3.2) \_\_\_\_\_ mm (in)

Results of visual inspection (sling vehicles only) after Curb Test (5.3.4 to 5.3.5)

\_\_\_\_\_

Results of visual inspection after Highway Frequency Vertical Shock Test (5.3.6 to 5.3.7)

\_\_\_\_\_

NOTE—If dolly was used, record how high lifted wheels were raised to compensate for dolly height

Results of visual inspection after Roll Test (5.3.8 to 5.3.9)

\_\_\_\_\_

Results of visual inspection after Pitch Test (5.3.10 to 5.3.11)

\_\_\_\_\_

Results of visual inspection after Highway Test (5.3.12 to 5.3.13)

\_\_\_\_\_

Results of visual inspection after Grade Test (5.3.14 to 5.3.15)

\_\_\_\_\_

Results of visual inspection (sling vehicles only) after Normal Brake Stop (5.2.16 to 5.2.17)

\_\_\_\_\_

Results of visual inspection (sling vehicles only) after Panic Brake Stop (5.2.18 to 5.2.19)

\_\_\_\_\_

Results of Final Inspection (5.3.20)

\_\_\_\_\_

Results of Road Test (5.3.21)

\_\_\_\_\_

FIGURE 2—TEST DATA SHEET 2 (REAR TOW)

**SAE J1143 Revised FEB94**

Test Vehicle: Year \_\_\_\_\_ Make \_\_\_\_\_ Model \_\_\_\_\_ Number \_\_\_\_\_ Report No \_\_\_\_\_  
 Year \_\_\_\_\_ Pretest \_\_\_\_\_ Prototype \_\_\_\_\_ Pilotline \_\_\_\_\_ Production \_\_\_\_\_  
 Test Weight: Left Front \_\_\_\_\_ kg (lb) Right Front \_\_\_\_\_ kg (lb) Total \_\_\_\_\_ kg (lb)  
 Left Rear \_\_\_\_\_ kg (lb) Right Rear \_\_\_\_\_ kg (lb) Total \_\_\_\_\_ kg (lb)  
 Tow Vehicle: Year \_\_\_\_\_ Make \_\_\_\_\_ Model \_\_\_\_\_ GVWR \_\_\_\_\_  
 Towing Equipment: Make \_\_\_\_\_ Model \_\_\_\_\_  
 Slings/Wheel Lift: Make \_\_\_\_\_ Model \_\_\_\_\_

**Wheel Alignment Data**

Front	Initial		After Front Tow (5.2.20)		After Rear Tow (5.3.20)	
	RH	(5.1.6) LH	RH	LH	RH	LH
Camber-degrees	_____	_____	_____	_____	_____	_____
Caster-degrees	_____	_____	_____	_____	_____	_____
Toe-mm (In)	_____	_____	_____	_____	_____	_____
Comments:	_____					
	_____					
	_____					
	_____					
	_____					

FIGURE 3—TEST DATA SHEET 3 (VEHICLE DATA)

- 5.1.7 Sheet metal, doors, deck lid, or tailgate clearance shall be within the vehicle manufacturer's tolerances. For light trucks, cab-to-body clearance shall be set to minimum dimensions, if applicable.
- 5.1.8 Check the bumper system for clearances to sheet metal, grilles, etc., to the vehicle manufacturer's tolerances. Realign, if required.
- 5.1.9 Check the bumper system fastener torques to the vehicle manufacturer's tolerances. Retorque to specifications, if required.
- 5.1.10 TEST VEHICLE LOADS
  - 5.1.10.1 The passenger cars shall be loaded to the vehicle manufacturer's recommended cargo capacity.
  - 5.1.10.2 The vans and light-duty trucks shall be loaded as specified by the vehicle manufacturer.
- 5.1.11 Record the final vehicle weights.
- 5.1.12 Drive the vehicle to determine if the vehicle is operating normally.

## 5.2 Front Towing Test Procedure

- 5.2.1 With the tow truck and vehicle on level ground, attach the tow-sling or wheel-lift equipment to the front end of the vehicle using the vehicle manufacturer's recommended procedure if available.
- 5.2.1.1 For tow-sling equipment, raise the front wheels to 102 mm (4 in) from the bottom of the tire above ground.
- 5.2.1.2 For wheel-lift equipment, position retaining/L arms as recommended by the equipment manufacturer and raise the front wheels to 255 mm (10 in) from the bottom of the tire above ground.
- 5.2.2 Determine the minimum ground clearance at the rear of the vehicle. Record the component closest to the ground and the amount of clearance on the applicable test data sheet.
- 5.2.2.1 If clearance is less than 4 in, use of a towing dolly is required. When dollies are used, increase the front tire ground clearance the same amount that the vehicle height is increased by use of towing dollies.
- 5.2.3 Set the ignition switch and transmission selector in the applicable position for towing and release the parking brake.
- NOTE—The following sequence is recommended, but not mandatory. Events may be resequenced as long as all the tests are performed.
- 5.2.4 CURB TEST (SLING VEHICLES ONLY)—This test is to determine ground clearance. At creep speed, drive off a 102 mm (4 in) curb with the towed vehicle centerline at 45 degrees to the curb on the right side. Repeat with the towed vehicle centerline at 45 degrees to the curb on the left side.
- 5.2.5 Conduct a visual inspection of the vehicle and towing equipment. Record any irregularities on the applicable test data sheet.
- 5.2.6 HIGH-FREQUENCY VERTICAL SHOCK TEST—This test is to induce vertical shock loads to determine stability of vehicle attachments. (This test is not to determine ground clearance which is evaluated in other portions of this procedure; however, after test is completed, verify that no detrimental damage has occurred to the vehicle.) Drive 1.6 km (1 mile) at 24 km/h (15 mph) on Belgian-block type road as specified by the vehicle manufacturer.
- 5.2.7 Repeat 5.2.5.
- 5.2.8 ROLL TEST—This test is to induce opposing roll between the towing and towed vehicles. Drive 0.8 km (0.5 miles) at 56 km/h (35 mph) on twisted-plane type road as specified by the vehicle manufacturer.
- 5.2.9 Repeat 5.2.5.
- 5.2.10 PITCH TEST—This test is to induce pitch between the towing and the towed vehicles. Drive at 24 km/h (15 mph) in the normal traffic lane through a 90-degree intersection of two highly crowned roads as specified by the vehicle manufacturer.
- 5.2.11 Repeat 5.2.5.
- 5.2.12 HIGHWAY TEST—This test is to evaluate both the handling characteristics of the combination during highway towing and the distance capabilities of the combination. Drive 80 km (50 miles) at 88 km/h (55 mph). Removal of axle shafts or driveshafts should be avoided and is not generally recommended. If required by the vehicle manufacturer's recommended towing procedure, driveshaft, or axle shafts as applicable, may be disconnected or removed for towing on the drive wheels at these speeds and distance. The use of a dolly may be specified when towing on the drive wheels. Refer to SAE J1142, 3.5 and 4.6.5.

## SAE J1143 Revised FEB94

- 5.2.13 Repeat 5.2.5 (if applicable, reinstall driveshaft or axle shafts removed in 5.2.12).
- 5.2.14 **GRADE TEST**—This test is to evaluate approach, departure and breakover, and stability of the towing equipment on grades. Drive 15% grade (8.5 degrees) uphill. Repeat drive in downhill direction. The entrance to the grade, the run of the grade, and the departure from the grade must each exceed the length of the towing/towed vehicles combination.
- 5.2.15 Repeat 5.2.5.
- 5.2.16 **NORMAL BRAKE STOP**—This test is to evaluate the stability of tow-sling equipment under normal braking conditions. Recognizing that movement damage could occur, the recommended method should minimize such damage. Make normal brake stops from 8.0 km/h (5 mph) to 56 km/h (35 mph) in 8.0 km/h (5 mph) increments.
- 5.2.17 Repeat 5.2.5.
- 5.2.18 **PANIC BRAKE STOP**—This test is to evaluate the stability of tow-sling equipment under severe braking conditions. Recognizing that major movement damage can occur, the recommended method should minimize such damage. Make panic brake stops (both feet on brake pedal) from 8.0 km/h (5 mph) to 32 km/h (20 mph) in 8.0 km/h (5 mph) increments.
- 5.2.19 Repeat 5.2.5.
- 5.2.20 **FINAL INSPECTION**—Depending on towing equipment used, detach vehicle and inspect for bumper system, air dam, and paint damage; buckles in body or sheet metal; proper opening and closing of doors, hood, and deck lid (or tailgate); and deformation of fuel tank, filler pipe, transmission and engine oil pan, and exhaust system. Perform a general undercarriage inspection including T-hook, J-hook, or grab-hook attachment points for deformation. Check front and rear wheel alignments after the test vehicle has been driven at least 1.6 km (1 mile) to normalize suspension components. Check the brake systems. Note observations and the results of all inspections on test data sheet (Figure 3).
- 5.2.21 Drive the vehicle to determine if the vehicle is operating normally.

### 5.3 Rear Towing Test Procedure

- 5.3.1 Set the front wheels in a straight ahead position and secure with an acceptable steering wheel locking device (refer to SAE J1142, 3.1.5).
- CAUTION—Do not use the vehicles steering column lock.
- 5.3.2 With the tow truck and vehicle on level ground, attach the towing equipment to the rear of the vehicle. Connect the steering wheel locking device.
- 5.3.2.1 For tow-sling equipment, raise the rear wheels to 102 mm (4 in) from the bottom of the tire above ground.
- 5.3.2.2 For wheel-lift equipment, raise the rear wheels to 255 mm (10 in) from the bottom of the tire above ground.
- 5.3.3 Determine the minimum ground clearance at the front of the vehicle. Record the component closest to the ground and the amount of clearance on the test data sheet.
- 5.3.3.1 If clearance is less than 102 mm (4 in), use of a towing dolly is required.
- 5.3.4 Put the ignition switch and transmission selector in an applicable position for towing and release the parking brake (see note in 5.2.3).