SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1884

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Vehicle Jack Requirements and Test Procedure

Foreword—This SAE Recommended Practice is a replacement for SAE J978 and J979 that were written by the Passenger Car Bumper Committee in January of 1967. These early Recommended Practices describe requirements to ensure load carrying capacity of bumpers to withstand bumper jacking loads and requirements to ensure quality and uniformity of bumper jacks.

With the arrival of federally mandated crash safety performance of passenger cars and light trucks, both the bumper and body structure were designed for optimum energy management during impact. To prevent damage to this system, the bumper could no longer be used as a jacking point. The jack point was either under the axle or under the body sill area. In the sill area, the body structure could be created to accept a concentrated vertical loading without greatly increasing the vehicle weight.

Concepts for jacking at the sill took many forms. One example was a modified bumper jack that positioned the column horizontally to make a rack jack for the vehicle sill. For some European models, the jack became a tripod device with a vertical screw designed to lift the vehicle at the sill. Others engaged the structure at the sill, but functioned with a short vertical column in a manner similar to a bumper jack. In most cases, however, jacks were designed to be three, four, or six link scissors types, with substantially horizontal drive screws.

With the development of these new jack designs, a new SAE Recommended Practice was required to encompass all designs.

1. ***Scope***—The scope of this SAE Recommended Practice is restricted to the testing of jacks supplied as original equipment on passenger cars, light trucks, and vans. To this end, both component suppliers and vehicle manufacturers are guided in the proper design and testing of jacks.

1.1 **Purpose**—The purpose of this document is to provide a test procedure that can be used to ensure reasonable quality and uniformity for vehicle jacks as supplied as original equipment.

1.2 **Rationale**—SAE J1884 is no longer necessary and will be replaced by ASME PALD-2003 Safety Standard for Portable Automotive Lifting Devices.

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2. References

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

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

SAE J978—Bumper Jacking Test Procedure—Motor Vehicles
SAE J979—Bumper Jack Requirements—Motor Vehicles

3. Definitions

3.1 Front GAWR (Passenger Car)—The passenger car front Gross Axle Weight Rating as supplied by the vehicle manufacturer. This is model specific and usually includes an "added factor" or fixed weight assigned to account for the additive effect of small weight increases during the model run. In addition, the front GAWR includes the sum of the weight reactions shared by the front wheels of the following:

1 - The vehicle base weight
2 - All fluid weight
3 - The sum of the weights of all options weighing 2.3 kg or more
4 - The total luggage or cargo weight
5 - The total passenger load

3.2 Rear GAWR (Passenger Car) —The passenger car rear Gross Axle Weight Rating as supplied by the vehicle manufacturer. This is model specific and usually includes the same "safety factor" that was assigned to the front. In addition, the rear GAWR includes the sum of the weight reactions shared by the rear wheels of the following:

1 - The vehicle base weight
2 - All fluid weight
3 - The sum of the weights of all options weighing 2.3 kg or more
4 - The total luggage or cargo weight
5 - The total passenger load

3.3 Maximum GVWR (Passenger Car)—The passenger car maximum Gross Vehicle Weight Rating as supplied by the manufacturer. This is model specific and usually includes the sum of the following:

1 - The vehicle base weight
2 - All fluid weight
3 - The sum of the weights of all options weighing 2.3 kg or more
4 - The total luggage or cargo weight
5 - The total passenger load
6 - The same "safety factor" or similar fixed weight that was assigned to either the front or rear to account for the additive effect of small weight increases not anticipated during the model run

3.4 Front GAWR (Truck)—The maximum load carrying capacity of the front axle system as supplied by the vehicle manufacturer. The number is printed on the Vehicle Certification Label applied to the latch face of the driver's door. This rating is equipment specific and represents the lowest maximum load carrying capacity of the front axle, brakes, springs, tires, or wheels.

3.5 Rear GAWR (Truck)—The maximum load carrying capacity of the rear axle system as supplied by the vehicle manufacturer. The number is printed on the Vehicle Certification Label applied to the latch face of the driver's door. This rating is equipment specific and represents the lowest maximum load carrying capacity of the rear axle, brakes, springs, tires, or wheels.

3.6 GVWR (Truck)—The maximum Gross Vehicle Weight Rating of a fully loaded vehicle as supplied by the manufacturer. This is predicted on the equipment ratings of the front and rear axles, but is always less than the arithmetic sum of the front and rear GAWRs.

4. Technical Requirements—During the checking of this technical requirement of vehicle jacks, all four wheels of test vehicle are to be on a level paved surface. The vehicle transmission is to be in park position (reverse gear for vehicle with manual transmissions) and the parking brake applied per manufacturer's instructions unless otherwise specified. The vehicle shall be loaded to maximum GVWR (passenger car) or GVWR (truck) with the load adjusted to ensure the axle being jacked is loaded to GAWR. Insure that all jack to vehicle interface locations (i.e., rocker, chassis) are attached to the vehicle per manufacturer's specifications.

4.1 Lift Requirements

4.1.1 The jack shall be tested to demonstrate that it can be positioned under each of the manufacturer's recommended lift points with the corresponding tire deflated provided that the deflated tire is on a wheel which reflects minimum diameter tire/wheel combination originally released for the vehicle.

4.1.2 The jack shall be tested to show that it has sufficient travel to raise the vehicle at each of the manufacturer's recommended lift points to a height where there is a 50 mm minimum clearance between a corresponding fully inflated new tire (which represents largest diameter released tire/wheel combination originally released for the vehicle) and the test surface. The maximum jack load and raised height shall be measured and recorded for each jack position. (Possible method to measure jack load is via a load cell under the jack and corresponding blocks of equivalent height under the tires.)

4.2 Endurance Requirement—The jack shall be tested to demonstrate, without loss of function, its capacity to raise and lower the vehicle at least 25 times from a lowered position (see 4.1.1) to a raised position (see 4.1.2) and back to a lowered position.

4.2.1 The jack shall be operated six times at each jacking position starting from position giving the heaviest jack load and returning to that position on the 25th cycle.

4.2.2 Operating handle effort at the start of the 5th, 10th, 15th, 20th, and 25th cycles shall not exceed 47.5 Nm for a screw operated jack for 534 N or a ratchet or hydraulic type jack.

4.3 Stability Requirements

4.3.1 Using the largest diameter wheel/tire combination, with the inflated tire raised a minimum of 50 mm from the corresponding level paved surface, the vehicle shall remain on the jack when a push-off force of 220 N is applied to the vehicle for 30 s in the forward, rearward, and side directions 760 mm above a level paved surface providing that:

a. The jack is placed at the manufacturer's recommended lift point corresponding to the raised tire
b. No blocks are used to prevent vehicle movement unless supplied with vehicle and used per manufacturer's instructions
c. Brakes are not applied
d. Transmission is in neutral gear