

	SURFACE VEHICLE RECOMMENDED PRACTICE	SAE J1890	NON-CURRENT AUG2007
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Performance Assurance of Remanufactured, Hydraulically-Operated Rack and Pinion Steering Gears			

RATIONALE

The Service Development Technical Committee requests that this document be re-classified as "Noncurrent". The reason for the change of designation is that we no longer have any members with expertise to maintain the document.

1. SCOPE

In order to insure that the remanufactured and/or rebuilt steering gear has and maintains the reliability and performance associated with a new OEM steering gear, it is essential that the following procedures be followed; if in-house engineering capabilities are limited, it may be necessary to consult with an outside laboratory to insure all testing methods used meet with the requirements outlined in this paper.

2. REFERENCES

There are no referenced publications specified herein.

3. DEFINITIONS

3.1 Remanufacturing

A process in which worn units are completely taken apart and all components inspected prior to reassembly. Components within specs are reused; components out of spec are either repaired or replaced with new components.

4. PERFORMANCE SPECIFICATIONS

4.1 In order to perform a functional and valid test of the rack and pinion steering gear, and to determine its performance characteristics, it is essential that the testing apparatus is capable of maintaining:

4.1.1 Constant Temperature

43 to 49 °C (110 to 120 °F).

4.1.2 Constant Pressure

84.6 to 105.7 kg/cm² (1200 to 1500 psi).

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4.1.3 Constant Flow

6.0 to 7.9 L/m (1.6 to 2.1 gpm).

Although the required specifications may vary, the apparatus should have the capability of maintaining relief valve pressure of approximately 84.6 to 105.7 kg/cm² (1200 to 1500 psi), fluid temperature of 43 to 49 °C (110 to 120 °F), and flow in the range of 6.0 to 7.9 L/m (1.6 to 2.1 gpm).

In addition to checking hydraulic flow, the apparatus must be capable of rotating the unit to be tested by the input shaft at a specific rate. A normally accepted range is 15 to 25 rpm rotation of input shaft while resistance to this movement is measured in in-lb, as well as moving the unit by the rack, pushing the rack at a rate of 2.54 to 3.80 cm/s (1 to 1.5 in/s).

Further, measure oil flow from gear when valve is shut off in increments of 0.38 L/m (0.1 gpm).

It is important that all readings be consistent, taken at the same, predetermined points.

4.2 Functional Data

To obtain functional data, OEM service manuals should be consulted first. If detailed test data is not available, a comparative test database can be developed by testing approximately 10 to 12 new, like rack and pinion units, maintaining constant temperature, flow and pressure as stated in 4.1.1, 4.1.2, and 4.1.3 in order to obtain high and low limits for that specific unit.

5. FUNCTIONAL TESTING

5.1 In order to establish a test database by testing new gears, and upon completion of the final assembly process, the finished gear must pass a series of functional tests to insure the performance and reliability of the steering gear. These tests include wet mesh, dry mesh, wet returnability, dry returnability, internal leakage, external leakage, and valve balance. A description of each of these tests follows:

5.2 Wet Mesh/Dry Mesh

These two tests are similar in nature; the only difference is whether the gear is charged (wet) with hydraulic fluid or drained (dry) of hydraulic fluid.

In performing this test, the gear is driven by the input shaft through its entire travel at a specified rate and the resistance to rotation of the input shaft must be measured.

a. Typical Readings

1. Wet mesh 5.8 to 28.8 kg·cm (5 to 25 in-lb) (resistance to rotation)
2. Dry mesh 5.8 to 28.8 kg·cm (5 to 25 in-lb) (resistance to rotation)

The resistance measured must be smooth and cannot exceed 10 in-lb in variation.

5.3 Wet Returnability/Dry Returnability

The wet and dry configuration of these tests is the same as previously mentioned in the mesh test. In performing the test, the gear is driven through its entire travel by the rack at a specified rate and the resistance to this travel is measured.

a. Typical Readings

1. Wet returnability 45.4 to 68.0 kg (100 to 150 lb)
2. Dry returnability 45.4 to 68.0 kg (100 to 150 lb)