

## CIRCULAR NO. 31-2-1

### ADR 31 - HYDRAULIC BRAKING SYSTEMS

ADR No. 31 - Hydraulic Braking Systems requires that all passenger cars comply with the requirements of the Rule. The level of testing needed to establish compliance of every possible vehicle variant could be most extensive. Therefore the Board has decided to accept braking tests based on grouping of vehicles and braking systems for the purpose of demonstrating compliance with ADR 31 and the issue of Compliance Plate Approvals.

An implementation procedure is attached which details the requirements for selection and testing to demonstrate compliance of a range of vehicles, and for limited additional tests to demonstrate compliance of a vehicle with minor variations in the braking system.

It will be the responsibility of the vehicle manufacturer to ensure that every vehicle to which a Compliance Plate is affixed complies with the Design Rule.

The Australian Motor Vehicle Certification Board wishes to advise manufacturers that the vehicle selection procedures delineated in the Circular will be kept under review and may be amended.

#### IMPLEMENTATION PROCEDURE

1. The Board requires that each unique brake system be subjected to the full series of tests required by the Design Rule.
2. To be considered as the same unique brake system, systems must have a combination of components which have the same physical and dimensional properties.
3. Any variation to the components of the brake system will constitute a different unique brake system except for:
  - (a) length, diameter or routing of connecting hydraulic or vacuum lines;
  - (b) location within a hydraulic or vacuum line, valves, fittings or other devices;
  - (c) the metallurgical condition of the disc or drum material.

### Selection of Vehicles

4. Each unique braking system shall be tested on each range of vehicles which have common characteristics.
5. Vehicles will be considered to be within a range for the purposes of testing, if they have:

- (a) body styles not affecting brake cooling air flow.

For example

Two door sedans, coupes and station wagons and four door sedans and station wagons can be regarded as common if this requirement is met. However, items that may affect air flow and therefore brake cooling will require separate tests to determine their effect on brake performance. Some such items are:

- (i) front air dam or spoiler;
  - (ii) wheel opening flares;
  - (iii) air ducts;
  - (iv) functional louvres.
- (b) the same suspension configuration;
  - (c) variation in wheel base of not more than 5% from shortest to longest.

### First Test Vehicle

6. The first test vehicle selected in the range shall have:
  - (a) greatest maximum loaded test mass, including options as specified in clause 31.1.8;
  - (b) longest wheelbase for a given maximum loaded test mass;
  - (c) automatic transmission when available;
  - (d) an engine with the highest nett engine power;
  - (e) smallest section width tyres offered for this vehicle;
  - (f) wheels having the least vent area, with wheel ornamentation installed if available.

### Tests required to cover vehicle range

7. The first test vehicle selected shall be subjected to the full series of tests required by the Design Rule.

### Second Test Vehicle

8. A second series of tests shall be conducted on the second test vehicle selected from within the range which has:
  - (a) the same unique brake system as the first vehicle;

- (b) a lower proportion of 'Lightly Loaded Test Mass' on the rear wheels than any other vehicle in the range;
  - (c) smallest section width tyres offered for this vehicle;
  - (d) wheels having the least ven area, with wheel ornamentation installed if available.
9. The second series of tests shall be conducted on this vehicle for test sequences 1 to 9 inclusive as specified in Clause 31.3.1 of the Design Rule.

### **Variant of Unique Braking System**

10. Where a braking system differs from another it may be regarded as the variant for the purpose of testing and be tested as detailed in the following paragraphs. A variant of a braking system is one which differs only in one or more of the following components:
- (a) the parking brake mechanism;
  - (b) the brake power or power assist unit;
  - (c) the anti-lock or variable proportioning system.

### **Tests Required to Cover a Variant of the Unique Brake System**

11. Each variation from the unique brake system tested above shall be subject to those Design Rule tests which are relevant to the particular portion of the brake system changed.
12. Tests to be conducted on the variant of unique braking system shall be as follows:
- (a) in the case of a different parking brake or hand brake, those tests that are related to this system- Tests sequences 1,2,3,4,5 and 6 as specified in Clause 31.3.1 of the Design Rule;
  - (b) in the case of a change in brake power assist unit, anti-lock system or variable proportioning valve systems - Test sequences 1,2,3,4,5,7,8,9,25 and 26 as specified in Clause 31.3.1 of the Design Rule.
13. These tests shall be conducted on two test vehicles if a range of vehicles is to be covered. The test vehicles shall be selected on the same basis as the first and second test vehicles described in Clauses 6 and 8. The second vehicle is to be tested to test sequences 1,2,3,4,5,7,8. and 9 as specified in Clause 31.3.1 of the Design Rule.
14. Each vehicle manufacturer shall submit, as part of his ADR 31 Submissions, specifications and performance data of his range of vehicles and his test vehicle fleet which represent that range. It will be the responsibility of the manufacturer to demonstrate that compliance with the requirements of this Circular has been achieved and that the test vehicles are representative within the terms of the foregoing criteria for those vehicles for which approval is sought. Prior approval of the test vehicle fleet will not normally be given.
15. For other unique braking systems where it can be proved to the satisfaction of the Board by engineering analysis, laboratory testing or vehicle testing, that a particular braking system will give the most adverse braking performance, then only that unique braking system need be tested.
16. The Board reserves the right to include any vehicle or group of vehicles into the test fleet which it considers require testing to demonstrate compliance of the range of vehicles and their brake systems.