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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1240

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Submitted for recognition as an American National Standard

(R) FLYWHEEL SPIN TEST PROCEDURE

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

1. ***Scope*—**This SAE Recommended Practice applies to flywheels and flywheel-starter ring gear assemblies used with internal combustion engines of spark ignition and diesel type. Engine sizes are those capable of using SAE No. 6 through SAE No. 00 size flywheel housings.

1.1 **Purpose—**This document is intended to provide a uniform test procedure for flywheel assemblies to determine the rotative speeds at which they will either burst or withstand a specified limiting speed.

2. ***References***

2.1 **Applicable Publication—**The following publication forms a part of this specification to the extent specified herein. The latest issue of SAE publication shall apply.

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

SAE J1456—Maximum Allowable Rotational Speed for Internal Combustion Engine Flywheels

3. ***Test Facility*—**The potential for serious injury to test personnel requires that greatest attention be given to safety. The spin chamber enclosing covers or doors must be properly designed and constructed to contain the flywheel and the failed material. All rotating parts of the drivetrain between the power source and the spin chamber must have protective guards. The controls area should be safely isolated from the spin pit and drivetrain areas. A ventilation system should be provided for the removal of iron dust to prevent injury to eyes and lungs by the flying iron dust when the spin chamber doors are opened. The test area must have the cautionary signs and warning bells, etc.

The following items are normally required for a test facility:

3.1 Burst test chamber and associated drive equipment.

3.2 Speed counter capable of recording burst speed or maximum speed attained. Recommend two speed counters be used, one as a back-up. Speed counters should be calibrated periodically.

3.3 Expendable type adapter flange for attaching the flywheel to the spindle shaft, etc.

3.4 Flywheel to adapter mounting hardware.

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3.5 Soft lining of pit (wood, cardboard, etc.—when retrieval of the failed flywheel pieces is necessary for inspection).

3.6 Dial indicator to check the concentricity and runout of the flywheel after it is mounted on the adapter flange.

3.7 Lifting crane.

3.8 Storage area and the necessary tools.

3.9 High-speed camera utilization capability, if desired.

4. ***Test Equipment and Drive System—***The equipment may provide for testing of the flywheels in the horizontal or vertical axis position. The drive system adapters, etc., must be so designed that vibration is kept to a minimum. A disconnect clutch or equivalent cutoff system is recommended between the power source and the spindle to prevent extensive damage to the drive system components in case of sudden spindle seizure. If desired, spin chamber may be evacuated to control the flywheel test temperature or to reduce its uncontrolled vibration and prevent quill shaft failure, which may be caused by air turbulence when testing inside small test chambers.

5. ***Test Procedure***

5.1 Flywheels should be spin tested with the ring gear installed unless the ring gear is not part of the flywheel assembly.

5.2 Flywheels without counterweight are usually spin tested one at a time. If the drive system is capable, flywheels with counterweight may be spin tested in pairs; heavy or light side of the flywheels positioned opposite in relation to each other. If tested one at a time, flywheels with counterweight should make a balanced assembly when mated with the adapter flange.

5.3 Prior to spin testing, the flywheel is to be identified, checked for material and dimensional defects, and balanced to print specification. Hardness readings should be taken on all critical areas of the flywheel and recorded. See SAE J1456 for recommended hardness checking areas for typical flywheel profiles.

5.4 Clean all clamping faces and piloting bores on the flywheel and adapter free of dust and dirt.

5.5 Assemble the adapter flange to the spindle shaft and the flywheel to adapter flange.

5.6 Check and record flywheel concentricity and runout as assembled on the spin test adapter.

5.7 Record ambient and flywheel test temperature prior to spin testing.

5.8 Spin each flywheel assembly to the predetermined speed limit and hold at that speed for 5 seconds or until burst occurs or vibration becomes excessive. Acceleration rate to suit flywheel size and the drive system capability.

5.9 Cracking or bursting of the flywheel assembly below the predetermined speed limit shall constitute failure.

6. ***Inspection of Test Parts after Spin Testing—***When desired, chemical and physical data can be obtained

after testing the flywheel. Material strength is to be established by test bars removed from the critical areas of the broken flywheel parts. Chamber walls must be cushion-lined to assure the reliability of the test bar data. If broken parts from the critical areas are too small and do not permit removal of test bar, then test bar may be removed from another area of the flywheel with similar hardness level. If this is also not possible, a flywheel with similar strength level may be cut for test bar removal. However, the flywheel must have similar hardness, porosity, and defect levels in all critical areas and must be:

a. From the same pour for cast type gray iron, nodular iron, and steel flywheels
b. From the same heat for forged type steel flywheels

7. ***Maximum Allowable Rotational Speed for Flywheels—***For maximum allowable rotational speed for internal combustion engine flywheels, see J1456.

8. ***Notes***

8.1 **Marginal Indicia—**The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE CLUTCH FLYWHEEL & HOUSING STANDARDS COMMITTEE