

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 Document

The following publication form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publication

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1456 Maximum Allowable Rotational Speed for Internal Combustion Engine Flywheels

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3. TEST FACILITY

The potential for serious injury to test personnel requires that greatest attention be given to safety. The test area must include appropriate protective guarding, cautionary signage, audible and visual alarms, etc. The following items are normally required for a test facility:

3.1 Burst test chamber - The burst test chamber should feature/include:

- 3.1.1 Soft lining of burst test chamber (pit) (i.e. wood, cardboard, etc) is necessary to ensure the reliability of the test bar data when retrieval of failed flywheel pieces is necessary for inspection
- 3.1.2 Proper enclosing covers or doors on the burst test chamber designed and constructed to contain the burst flywheel and the failed material
- 3.1.3 A ventilation system to evacuate iron dust from the burst test chamber prior to opening the chamber doors to prevent injury to eyes and lungs by flying iron dust
- 3.1.4 Capability to use a high-speed camera to photograph flywheel burst failures starting at the instant of failure and continuing through the end of the failure event.
- 3.1.5 A lifting crane (if required or desired).
- 3.1.6 If burst test chamber size is small relative to the flywheel, the chamber may be evacuated, if desired, to:
 - Control flywheel test temperature
- or -
 - Reduce vibration caused by air turbulence to control spindle shaft loading

3.2 Test equipment and drive system

- 3.2.1 The equipment may provide for testing of the flywheels in either the horizontal or vertical axis position.
- 3.2.2 All drive system components, drivetrain, spindle shaft and expendable adapters, etc., must be designed to minimize vibration.
- 3.2.3 A disconnect clutch or equivalent cutoff system is recommended between the power source and the spindle shaft to prevent extensive damage to drive system components in case of sudden spindle seizure.
- 3.2.4 All rotating parts of the drivetrain between the power source and the burst test chamber must have protective guarding

3.3 Controls area:

- Safely isolated from the burst test chamber and burst test drive system
- Includes a rotational speed counter capable of recording burst speed or maximum test speed attained:
 - Use of two speed counters is recommend - one as a back-up.
 - Speed counters must be calibrated periodically.

3.4 Tool storage area - Tools, gages and hardware required include:

- Thermometers - to measure:
 - Burst test chamber ambient temperature (dry bulb)
 - Test part surface temperature (contact or infrared)
- Dial indicator to check concentricity and runout of the flywheel after it is mounted on the adapter flange.
- Expendable adapters designed to align and attach the flywheel pilot bores relative to the spindle shaft centerline
- Flywheel-to-adapter mounting hardware

4. TEST PROCEDURE

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

4.2 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.

4.3 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.

4.4 Clean all clamping faces and piloting bores on the flywheel expendable adapter and spindle shaft to insure they are free from dust and dirt.

4.5 Install the expendable adapter onto the spindle shaft.

4.6 Install the flywheel onto the expendable adapter.

4.7 Check and record flywheel concentricity and runout relative to the spindle shaft centerline.

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

4.9 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 of the test sample should be suited to both flywheel size and the drive system capability.

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