Safety for Industrial Flail Mowers—SAE J1001 DEC80

SAE Recommended Practice
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LAND SEA AIR SPACE

PREPRINT

SAFETY FOR INDUSTRIAL FLAIL MOWERS—SAE J1001 DEC80

SAE Recommended Practice

Report of the Construction and Industrial Machinery Technical Committee, approved February 1974, editorial change December 1980.

1. Purpose and Scope

1.1 Purpose—This SAE Recommended Practice is intended to be used as a guide for manufacturers and users of industrial-type flail mowers to improve the degree of personal safety for operators and others during normal operation and servicing. Inclusion of this practice in state, federal, or any laws or regulations where flexibility of revision is lacking is discouraged.

1.2 Scope—This practice includes industrial-type flail mowers designed for operation with tractors having at least 20 hp (15 1cW) and used for cutting grass adjacent to highways or similar types of grass and growth control.

2. Definitions and References—For the purpose of these specifications, the following definitions and references are used to clarify the requirements.

2.1 Flail Mower—A flail mower is one that has a multiplicity of knives which rotate about a horizontal axis.

2.2 Permanent Safety Signs—Permanent safety signs shall be legible and conform to SAE J208 color and quality requirements.

2.3 Nomenclature—The nomenclature used in this recommended practice is that specified by SAE J990.

3. Literature and Instructions

3.1 Permanent Safety Signs—The words DANGER—DISCHARGE OPENING, easily legible from a standing position, shall be placed on the mower at or near each discharge opening. Permanent instructions shall be placed on the mower, near the opening, stating that the mower shall not be used with the deflector or the attachment removed. Suggested wording: DANGER! DO NOT OPERATE WITH DEFLECTOR(S) OR ATTACHMENTS REMOVED. Attachments serving as deflectors must be identified.

3.1.1 Permanent instructions DANGER! DO NOT OPERATE IN TRANSPORT POSITION shall be prominently displayed on the mower and visible from the operator's station.

3.2 Literature—Literature accompanying the mower and/or attachments shall caution the user of the hazards associated with the use of mower and/or attachments and against the use of the mower with the attachments or deflectors removed.

4. Structural Requirements

4.1 Mower Structure—The mower housing, deflectors, and attachments shall be designed, fabricated, and assembled in such a manner that, under normal operating conditions or the destructive conditions of the knife and knife-mounting strength tests, none of the component parts of the mower shall fracture, break, loosen, or deform in a manner that will make the mower hazardous to the operator or bystanders. The prescribed tests on rotating parts shall be cumulative.

4.1.1 The housing, deflectors, and attachments shall be constructed of materials capable of withstanding, without failure in a hazardous manner, the impact of any object thrown by the knives at maximum force.

4.1.2 The housing, deflectors, and attachments shall prevent the emergence of any ejected material in a hazardous manner.

4.2 Extent of Enclosure—The mower knives shall be enclosed, except as specified in paragraphs 4.2.1 and 4.2.2, in the operating position.

4.2.1 DEFLECTORS—Deflectors that are readily adjustable beyond the limits specified, or are readily removable, shall not be used except as follows:

4.2.1.1 *Attachments Serving as Deflectors*—Attachments may be substituted for a deflector over an opening on the housing only if the requirements of paragraph 3.2 are complied with.

4.2.2 OPENINGS—Openings in the housing for the entrance and discharge of material to be cut and for other purposes shall be limited as follows:

4.2.2.1 Discharge openings shall be only to the front or rear, with respect to the direction of travel of the propelling vehicle.

4.2.2.2 Mowers which eject the material forward in the direction of ground travel when cutting shall limit the path of the ejected material to the space below a horizontal plane intersecting the centerline of the tractor rear axle, rearward of the tractor rear axle.

4.2.2.3 Mowers which eject material rearward with respect to the direction of travel shall limit the path of the ejected material to a downward direction.

4.2.2.4 Means shall be provided at openings to minimize unintentional contact between the knives and personnel adjacent to the mower.

5. Rotor Requirements and Tests

5.1 Knife Mounting Durability—In a flail rotor, the means of fastening the knives to the rotor shaft shall be so designed that they will not become worn to a hazardous condition, or fail, before the knives themselves are worn beyond practical use.

5.2 Strength Tests for Knives and Knife Mountings—The following tests shall be conducted (using a standard production model) on the complete mower and operated at a minimum speed of 10% over specified input speed. The cutting elements and attaching means, including knives, couplings, and fasteners, shall be secured to the rotor in such a manner that, under the conditions of the tests, none of the component parts shall fracture, break, loosen, or deform in a manner hazardous to the operator or bystanders.

5.2.1 SUDDEN IMPACT TEST—A test obstruction shall be constructed and installed in the ground as shown in Fig. 1. The flail mower cutting height shall be set to cut 2 in. (50 mm) above a level floor. The flail mower shall be dropped onto the test obstruction, so that the entire cutting length of the flail mower contacts the test obstruction. The flail mower shall be held in this position for 30 s. The test shall be repeated for a total of six times.

5.2.2 REPEATED IMPACT TEST—Using the obstruction and cutting knives in paragraph 5.1, this test is conducted by moving the flail mower from a point rearward of the test obstruction forward at the rate of 1 mph (1.6 km/h) until the centerline of the rotor is positioned over the vertical leg of the angle of the obstruction. The test shall be repeated a total of 25 times.

5.2.3 MISSING BLADE IMBALANCE TEST—One horizontal row of cutting elements shall be removed, including the attaching hardware. Simulate an emergency shutdown by running for 2 min.

6. Operation

6.1 Mower Controls—Mowers shall be capable of being shut off by means located within the convenient reach of the operator.

6.1.1 In the case of multiunit mowers, means must be provided for the operator to shut off any section which is to be carried in a raised or transport position, while mowing continues with other sections. (See paragraph 3.1.1.)

6.2 Drive Shielding—Drive shafts, belts, etc., must be shielded in accordance with SAE J208. Any warning or safety signs required by these recommended practices shall be permanently affixed at the appropriate places.