

AEROSPACE STANDARD

SAE AS4786

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Driver Drills Battery Powered

1. SCOPE:

This SAE Aerospace Standard (AS) covers variable speed, reversible 0.375 (3/8) in chuck battery powered drills, with removable, rechargeable battery pack, used for general maintenance and construction where a battery powered tool is required. When electromagnetic interference (EMI) suppression is required by the purchaser, this document satisfies EMI requirements for driver drills.

This document may involve hazardous materials, operations, or equipment. This document does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this equipment to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to its use. Users are cautioned to read all manufacturer's instructions prior to use.

1.1 Classification:

Driver drills covered by this document shall be of the following types, classes, and styles as established:

a. Type I - 7.2 V

Style A: With keyed chuck
Style B: Keyless chuck

b. Type II - 9.6 V, minimum 5 position adjustable clutch

Style A: With keyed chuck
Style B: Keyless chuck

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1.1 (Continued):

c. Type III - 12 V, minimum 5 position adjustable clutch

Style A: With keyed chuck

Class I:	90 in-lb torque minimum
Class II:	140 in-lb torque minimum
Class III:	175 in-lb torque minimum

Style B: Keyless chuck

Class I:	90 in-lb torque minimum
Class II:	140 in-lb torque minimum
Class III:	175 in-lb torque minimum

2. APPLICABLE DOCUMENTS:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 Underwriters Laboratories (UL) Publications:

Available from Underwriters Laboratories, 333 Pfingston Road, Northbrook, IL 60062.

UL45	Standard for Portable Electric Tools
UL498	Standard for Attachment Plugs and Receptacles
UL1012	Standard for Power Units Other Than Class 2
UL1054	Standard for Special Use Switches
UL1310	Standard for Class 2 Power Units

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2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-461 Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference

MIL-STD-810 Environmental Test Methods and Engineering Guidelines

3. REQUIREMENTS:

3.1 Conformance to Underwriters Laboratories Standards:

The driver drills and components covered by this document shall, prior to modification for EMI suppression, comply with all requirements of Underwriters Standard UL45. Conformance to UL45 shall be demonstrated by a UL label or by testing by an independent accredited laboratory. All components shall conform to the applicable UL standards shown herein.

3.2 General:

Unless otherwise specified, driver drills specified under this document shall include a battery, charging unit, operating and maintenance instructions, carrying case, maintenance tools and accessories normally furnished by the manufacturer. Driver drills shall conform to the applicable requirements of Table 1.

TABLE 1

Type	Volts (DC)	Weight With Battery (lb-max)	Speed of Chuck (No Load) rpm	Torque at Chuck (min-in lb)
I	7.2	3.5	500 - 800	40
II	9.6	4.5	300 - 500 Low 900 - 1500 High	90
III	12.0	5.0	300 - 600 Low 900 - 2000 High	Class 1 - 90 Class 2 - 140 Class 3 - 175

- 3.2.1 Housing: The housing shall be insulated fiberglass, nylon, or other plastic with either a formed pistol grip or "T" handle. The housing shall meet the crush or drop test requirements when tested in accordance with UL45.

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- 3.2.2 Chucks: Chucks shall be 0.375 (3/8) in capacity. Chucks shall be of the three jaw gear type (keyed or keyless). When Style A is specified, a key shall be provided.
- 3.2.3 Motor: The motor shall be of the continuous duty type and shall operate on direct current. The motor, except for the ventilation openings, shall be completely enclosed within the housing.
- 3.2.4 Switch: The switch(es) shall comply with UL1054. The switch shall allow for operation in both forward and reverse directions and a trigger type switch which produces variable speed dependent on switch pressure shall be provided. A safety setting to lock the switch in the off position to prevent accidental starts shall be provided.
- 3.2.5 Clutch: Type II and Type III driver drills shall be equipped with an adjustable clutch regulating the amount of output torque delivered by the chuck. A minimum of five clutch settings is required.
- 3.2.6 Charging Unit: The charging unit shall comply with UL1012 or UL1310 and UL498 as applicable. The charging unit shall include a light indicating a fully charged condition. The charger shall be capable of fully charging the battery pack in accordance with manufacturer's instructions.
- 3.2.7 Battery: Batteries shall be 1.0 A.h minimum for Type I drills and 1.2 A.h minimum for Type II and III drills. The battery pack shall be removable from the drill housing for recharging. The battery shall be capable of being fully discharged and recharged a minimum of 200 times. In addition, a locking mechanism to prevent accidental disengagement of the battery pack shall be provided.
- 3.2.8 Lubrication: Drills shall be prelubricated by the manufacturer so that the bearings and gears will be constantly lubricated when in operation. Bearings and gears that require subsequent lubrication shall be arranged so that the proper lubricant can be applied. Pressure lubricant fittings shall not be used. The gear housing shall be enclosed to prevent any leakage of the lubricant.
- 3.2.9 Electromagnetic Interference (EMI) Suppression: When EMI suppression is specified by the purchaser (5.1), the manufacturer shall provide certification, based on test, that the suppression network in the drills conforms to MIL-STD-461, minimum radiated susceptibility test RS101, RS102, RS103 and minimum radiated emission test RE101, RE102. The manufacturer shall supply a schematic and listing of the components in the EMI suppression network, including part numbers and component values for repair purposes.