SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS4786 | REV. A

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Superseding AS4786

(R) Driver Drills, Battery Powered

RATIONALE

This SAE Aerospace Standard (AS) is being updated and revised due to the change in technology in for such type power drills with removable and rechargeable batteries. This document also reflects the EMI requirements for driver drills, where EMI suppression is required by the purchaser.

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1. SCOPE

This SAE Aerospace Standard (AS) covers variable speed, reversible battery powered drills with removable, rechargeable battery pack and either 3/8 inch or ½ inch chuck used for general maintenance and construction where a battery powered tool is required. This document also satisfies EMI requirements for driver drills, where EMI suppression is required by the purchaser.

This document may involve hazardous materials, operations, or equipment and does not purport to address all of the safety considerations associated. It is the responsibility of the user of a piece of equipment to establish appropriate safety and health practices and to 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:

1.1.1 Type 1 – 7.2V

Style A: Straight drive

1.1.2 Type II – 9.6V

Style A: Straight drive

1.1.3 Type III – 12.0V

Style A: Straight drive

Class I: 175 in-lb torque minimum

Class II: 250 in-lb torque minimum

Style B: Right angle drive

1.1.4 Type IV – 14.4V

Style A: Straight drive

Class I: 250 in-lb torque minimum

Class II: 350 in-lb torque minimum

Style B: Right angle drive

1.1.5 Type V – 18.0V

Style A: Straight drive

Class I: 350 in-lb torque minimum

Class II: 450 in-lb torque minimum

Class III: 550 in-lb torque minimum

Style B: Right angle drive

Class I: 100 in-lb torque minimum, 1000 rpm no-load speed minimum

Class II: 120 in-lb torque minimum, 1500 rpm no-load speed minimum

2. APPLICABLE DOCUMENTS

The following publications for a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of the 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 Inc., 333 Pfingston Road, Northbrook, IL 60062-2096, Tel: 847-272-8800, www.ul.com.

UL 745-3 Portable Battery-Operated Tools
(or UL60745-1)

UL 745-4-1 Particular Requirements for Battery-Operated Drills
(or UL60745-2-1)

UL 1012 Standard for Power Units Other Than Class 2

UL 1054 Standard for Special Use Switches

UL 1310 Standard for Class 2 Power Units

2.2 U.S. Government Publications

Available from the Document Automation and production Service (DAPS), Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, http://assist.dpas.dla.mil/quicksearch/.

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

MIL-STD-810 Environmental Test Methods and Engineering Guidelines

2.3 Other Publications

2.3.1 Power Tool Institute Publications

Available from the Power Tool Institute, 1300 Sumner Avenue, Cleveland, OH 44115-2851; or www.powertoolinstitute.com.

PTI LAB TEST PROCEDURE FOR DETERMINING STATED RELATIVE TORQUE MEASUREMENT FOR CORDED AND CORDLESS DRILLS, DRILL/DRIVERS, AND SCREWDRIVERS

(Referred to hereinafter as “PTI Test Procedure”.)

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 UL 745-3. Conformance to UL 745-3 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. Torque measurement shall be conducted in accordance with Section 4.3.3.

TABLE 1 – DRILL DRIVER REQUIREMENTS

TYPE	STYLE	CLASS	SPEED RANGES (min)	NO-LOAD SPEED (min RPM)	TORQUE (min in-lb)	CLUTCH SETTINGS (min #)	CHUCK SIZE (min in)
I (7.2V)	A	n/a	1	500	50	n/a	3/8
II (9.6V)	A	n/a	2	300 – low 1000 – high	200	15	3/8
III (12.0V)	A	I	2	300 – low 1200 – high	175	15	3/8
III	A	II	2	300 – low 1200 – high	250	15	3/8
III	B	n/a	1	800	44	n/a	3/8
IV (14.4V)	A	I	2	300 – low 1200 – high	250	15	3/8
IV	A	II	2	300 – low 1200 – high	350	15	½
IV	B	n/a	1	1000	100	n/a	3/8
V (18.0V)	A	I	2	300 – low 1200 – high	350	15	½
V	A	II	2	300 – low 1200 – high	450	15	½
V	A	III	2	300 – low 1700 – high	550	15	½
V	B	I	1	1000	100	n/a	3/8
V	B	II	1	1500	120	n/a	3/8

3.2.1 Housing: The housing shall be insulated fiberglass, nylon, or other plastic with either a formed pistol grip or "T" handle.

3.2.2 Chucks: Chucks shall be as stated in Table 1. Chucks shall be keyless and of the three jaw gear type.

3.2.3 Motor: The motor shall operate on direct current (pulse width modulation control is acceptable). The motor, except for the ventilation openings, shall be completely enclosed within the housing.

3.2.4 Switch: The switch shall be trigger type and shall produce variable drill speed dependent on switch pressure. The switch shall allow for operation in both forward and reverse directions. A safety setting to lock the switch in the off position to prevent accidental starts shall also be provided.

3.2.5 Clutch: Where noted in Table 1, Style A driver drills shall be equipped with an adjustable clutch regulating the amount of output torque delivered by the chuck. A minimum of fifteen clutch settings is required.

3.2.6 Charging unit: The charging unit shall comply with UL 1012 or UL 1310 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: The battery pack shall be removable from the drill housing for recharging. In addition, a locking mechanism to prevent accidental disengagement of the battery pack from the drill housing 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.