

MIL-STD-704 Guides Avionics Power Testing & Solutions

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Topics: [AC Power Sources](#)



Aircraft electronics and other electrically-powered equipment must be tested under extreme power conditions to ensure it will operate reliably once in the air. In the military world, MIL-STD-704 (now up to rev. F), 'Aircraft Electric Power Characteristics', establishes the requirements and characteristics of aircraft electric power.

The standard is not only used by the US military and military contractors, but has also been adopted, either directly or indirectly, worldwide. For example, the Chinese standard, GJB 181, 'Characteristics of aircraft electrical power supplies and requirements for utilization equipment,' is largely based on MIL-STD-704.

MIL-STD-704 actually defines the power characteristics of an aircraft electric power system, not the test requirements. For guidance on testing, there is a series of eight handbooks that specifies tests for different types of input power, titled MIL-HDBK-704. These guidance documents, including MIL-STD-704 (revisions A through F) are available online at [EverySpec.Com](#).

The tests specified in the MIL-HDBKs is designed to ensure that airborne utilization equipment, which is defined as equipment that receives power from the aircraft's electric power system, is compatible with the power system. To run these tests, a sophisticated power source is essential to simulate various power conditions. In addition, you also need whatever equipment is required to monitor the unit under test (UUT) while running the test.

AMETEK Programmable Power has provided test equipment for compliance tests for airborne utilization equipment for decades. Its test equipment systems cover the latest versions of MIL-STD-704 to make it more effective and easier to use. Its MIL-STD-704 test solutions are in use by customers in the USA and all over the world.

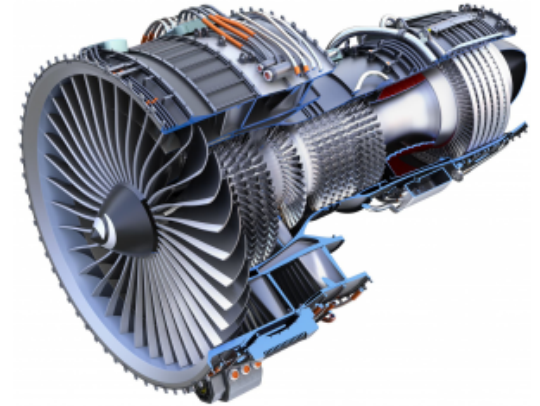
MIL-HDBK-704-1 through MIL-HDBK-704-8 specify the acronyms used for the seven power groups. These are:

- SAC (single phase 115V/400Hz)
- TAC (three phase 115V/400Hz)
- SVF (single phase 115V various frequency)
- TVF (three phase 115V various frequency)
- SXF (single phase 115V/60Hz)
- HDC (270V DC)
- LDC (28V DC).

MIL-HDBK-704-3 specifies AC tests

As an example, let's look at the tests specified by MIL-HDBK-704-3. This document provides guidance for testing utilization equipment that requires three-phase, 400Hz, 115 V AC power. It specifies 18 different test methods:

- Test Methods TAC 101 – 110 describe tests under normal operating conditions.



- Test Method TAC 201 describes a test under transfer conditions.
- Test Methods TAC 301 to 303 describe tests under abnormal conditions.
- Test Method TAC 401 describes a test under emergency conditions.
- Test Methods TAC 601 to 603 describe tests under power failure condition.

For every test method, MIL-HDBK-704-3 defines a detailed test procedure. Test Method TAC 109, 'Normal Voltage Transients', for example, specifies:

- Overvoltage transients, which consist of step changes from 115 V nominal to 140 V, 160 V, and 180 V with durations of varying length.
- Undervoltage transients, which consist of step changes from 115 V to 80 V and 90 V with durations of varying lengths.
- Combined transients, which consist of step changes from 115 V nominal to 80 V and 180 V with durations of 10 ms.
- Repetitive normal voltage transients, which consist of a step change from 115V to 90V, a ramp-up to 140V, and a ramp down to 115V.

The [AMETEK Programmable Power](#) MIL-STD-704 test software supports this test method, as well as other MIL-HDBK test methods. There is no need for additional programming. The complete test process can be accomplished by clicking on the tests you wish to perform.

For more information on avionics power testing, read the full article, "A guide to avionics power testing" on Aerospace Testing International's website or contact AMETEK Programmable Power toll free at 800-733-5427 or 858-450-0085 or email sales.ppd@ametek.com.