

## **Rugged Devices and Measurement of Ruggedness**

Those considering purchasing a rugged handset might like to consider the following facts regarding ruggedness ratings. Electronic devices marketed on "Ruggedness" are generally marketed as having passed one or more of the following standards: Military Standard 810-F, and IP Rating.

### **Military Standard 810-F**

The military standard referred to as MIL-STD-810, "The Department of Defense Test Method Standard for Environmental Engineering Considerations and Laboratory Tests" is comprised of about 600 pages, outlining 23 tests with multiple sub-tests that can be used to predict the ability of a device to work in certain environments. Although prepared specifically for DoD applications, the standard may be tailored for commercial applications as well.

MIL-STD-810-F is a flexible standard that allows commercial suppliers to tailor the test methods to fit the end-user's application. Suppliers can, and do, take significant latitude with how they test their products, as well as how they report the test results. As a result, claims of "compliance with MIL-STD-810" can be misleading. Users who require rugged devices should verify the test methods against which compliance is claimed. The 810-F standard is divided into 23 different tests for considerations like Low Pressure and Vibro-Acoustic affect, much of which may not apply to your device. Passing any of the tests allows a company a colorable argument that a device has a MIL-STD-810-F rating, which does nothing for the commercial user. Users should also verify to which parameter-limits a device was actually tested, as well as whether the testing was done internally, or externally by a reputable, independent testing facility.

As an example, "MIL-STD 810F Method 516.5 Shock" requires that items weighing 100 pounds or less survive a total of 26 drops on each face, edge and corner. The 26 drops can be divided among as many as five samples of the same test item, which probably means "use the first until it fails, then start with the second, until it passes," although the language leaves it open to interpretation. Generally a handset must be dropped from 48 inches onto plywood covered concrete. It also appears that the test can be conducted with the equipment in the off position.

As a result of the malleable nature of the testing procedure, the ability of commercial entities to decide what constitutes a passing result, and the ability to test for non-critical conditions and be "certified," the MIL-STD-

810-F is the least useful measure of ruggedness for a handheld electronic device and most demanding of critical analysis.

## IP Rating

A mobile device's IP rating (for "International Protection" Rating or alternately "Ingress Protection" Rating) classifies the level of protection provided by the device against the intrusion of solid objects like dirt, sand, dust, as well as liquids like water. It consists of the letters IP followed by two digits for the device's rating. This International standard aims to provide users with more detailed and factual information rather than being influenced by vague marketing terms such as "waterproof" or "water resistant." This rating shows conformance to the standards of the International Electrochemical Commission.

Solid objects: The first digit in the classification indicates the level of protection that the device provides against access to hazardous parts and the ingress of foreign objects.

0	No protection
1	Protected against solid objects greater than 50mm, as in an accidental touch by hands
2	Protected against solid objects up to 12mm, as in accidental poking by fingers
3	Protected against solid objects greater than 2.5 mm, such as tools or thick wires
4	Protected against solid objects greater than 1mm, such as wires or screws
5	Intrusion of dust is not entirely prevented, but it doesn't harm operation of the equipment
6	Total protection against dust and contact

Water and other liquids: The second digit in the classification indicates the level of protection against the harmful intake of water and other liquids.

0	No protection
1	Protection against vertically falling drops of water or condensation
2	Protection against direct sprays of water up to 15 degrees from vertical
3	Protection against direct sprays of water up to 60 degrees from vertical
4	Water splashing against the equipment from all directions shall have no harmful effects

5	Water projected by a nozzle against the equipment from any direction shall have no harmful effects
6	Water projected in powerful jets against the equipment, like on a ship deck, will have no harmful effects
7	Immersion of the equipment in up to one meter of water shall have no harmful effect

Certification of successful completion of IP testing by a reputable independent testing laboratory is good verification for IP rating compliance.