

## IP67, What Does That Mean?

There has always been considerable confusion regarding the rating systems for ruggedized Pocket PCs. If a unit is described as meeting a particular standard, that can be helpful in making a decision as to which Pocket PC to purchase, depending on the user's needs. This white paper will discuss two rating systems, the IP system and the MIL-STD-810. This is only a brief summary. Please review additional sources if you need a more complete definition of either standard.

**IP Ratings: (Ingress Protection or International Protection)** - The Ingress Protection rating system is a classification system showing the degrees of protection from solid objects and liquids. The first number refers to the protection against solid objects, normally dust in relation to testing Pocket PCs. If the first number is 0, there is no protection provided. A number 5 refers to limited protection against dust. The number 6 is for total protection against dust. The second number of the IP rating system refers to protection against liquids. A "0" indicates no protection, while a 7 refers to protection against immersion between 15 centimeters and 1 meter. The following two tables give the protection descriptions.

IP First number - Protection against solid objects

0	No special protection
1	Protection against accidental touch by hands
2	Protection against objects such as fingers
3	Protection against tools and wires
4	Protection against tools, wires, small wires
5	Limited protection against dust
6	Protected from dust

IP Second number - Protection against liquids

0	No Protection
1	Protection against vertically dropping condensation
2	Protection against direct sprays of water up to 15 degrees from vert.
3	Protection against direct sprays of water up to 60 degrees from vert.
4	Protection from sprays of water in all directions. Limited water ingress permitted
5	Protection from low pressure jets of water in all directions. Limited water ingress permitted
6	Nearly the same as # 5, except for ship decks
7	Protected against the effects of immersion in water to depth between 15 cm and 1 meter

Most environmentally sealed Pocket PCs are rated IP67. They are protected from dust and capable of withstanding water immersion between 15 cm and 1 meter for 30 minutes.

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**The MIL-STD-810 series of standards** are issued by the [United States Army's](#) Developmental Test Command, to specify various environmental tests to simulate conditions that the tested item will encounter in the field. The current revision, as of 2006, is revision F, issued January 1, 2000, superseding revision E from 1989.

MIL-STD810 E refers to the type of testing that mobile gear is put through to determine its ruggedness. Rugged mobile gear will state that it is MIL-STD810 E rated or may say it is MIL-STD810 F compliant. They both mean the same level of ruggedness is applicable. MIL-STD810 F is just a revision of MIL-STD810 E and applies more to the testing process rather than the resulting rating.

MIL-STD810 E and F are the highest standard for ruggedized testing for mobile gear. Always check for this testing result when looking at mobile gear that is labeled as "rugged". There are 24 categories which are tested and all must obtain the MIL-STD810 E/F rating to be considered rugged.

The 24 categories are as follows:

- Low Pressure (Altitude)
- High Temperature
- Low Temperature
- Temperature Shock
- Contamination by Fluids
- Solar Radiation (Sunshine)
- Rain Method
- Humidity
- Fungus
- Salt Fog
- Sand and Dust
- Explosive Atmosphere
- Immersion
- Acceleration
- Vibration
- Acoustic Noise
- Shock
- Pyroshock
- Acidic Atmosphere
- Gunfire Vibration
- Temperature, Humidity, Vibration, and Altitude
- Icing/Freezing Rain
- Ballistic Shock

Vibro-Acoustic/Temperature

These categories are tested to determine the environmental worthiness and durability of a design. There are guidelines for each phase of testing in all categories.

All mobile gear to be tested are first run under normal conditions to ensure that they do operate properly and to set a baseline performance.

Tests are conducted in natural environments or in laboratories in simulated conditions. When possible a combination of testing environments is used.

As an example of the rating systems being used, the following image shows the ratings for the Nomad 800 Series Pocket PCs.

**Extremely rugged**  
Operating temperature: -22 to 140 °F (-30 to 60 C)  
IP67 Rating  
Meets MIL-STD-810F testing standards for:  
Drops: Survives 38 drops from 4 ft (1.22 m) onto plywood over concrete  
Water: Survives immersion in water for 30 minutes  
Dust: Impenetrable to dust  
Temperature shock, vibration, altitude

It lists the IP67 rating plus the specific tests done under the MIL-STD-810F systems.

At a minimum, all environmentally sealed Pocket PCs used in the field should be shock resistant, water submersible, and dust proof.

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